Vol. II MARCH, 1916 No. 3

The INTERNATIONAL JOURNAL OF ORTHODONTIA

A Monthly Journal Devoted to the Advancement of the Science of Orthodontia

MARTIN DEWEY, D.D.S., M.D., Editor-in-Chief
H. C. POLLOCK, D.D.S., Associate-Editor

PUBLISHED BY
THE C. V. MOSBY COMPANY
SAINT LOUIS

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The International Journal of Orthodontia

Editor: Martin Dewey, D.D.S., M.D.

VOL. II ST. LOUIS, MARCH, 1916 NO. 3

ORIGINAL ARTICLES

FACE FACTS

A Clinical Study of Dento-Facial Deformities

BY B. E. LISCHER, D.M.D., ST. LOUIS.

Professor of Orthodontics, Washington University Dental School.

NUMEROUS, accurate investigations have conclusively demonstrated that in many communities 97 percent of the population is affected by decay of the teeth. In fact "it is now universally admitted that dental caries is the most prevalent of all diseases, that its numerical incidence is largely proportionate to the state of civilization to which a particular race has attained."

Deformities of the teeth, face and jaws are also very common (probably averaging as high as 50 percent), though the available statistics are too fragmentary to warrant final conclusions. "It is scarcely necessary to point out that the presence of such deformities interferes considerably with the exercise of the function of the teeth, and leads also to the development of other diseases."

The significance, therefore, of *normal dental function,* its influence upon jaw-growth and facial development during childhood, its relation to the health and well-being of the race, can hardly be overestimated. The dental axiom: *only a normal mouth can perform normal functions,* constitutes a tenet of a creed we were long in formulating, but one which is now quite generally accepted. And by a *normal mouth* we mean a mouth *free from deformity,* as well as from disease.

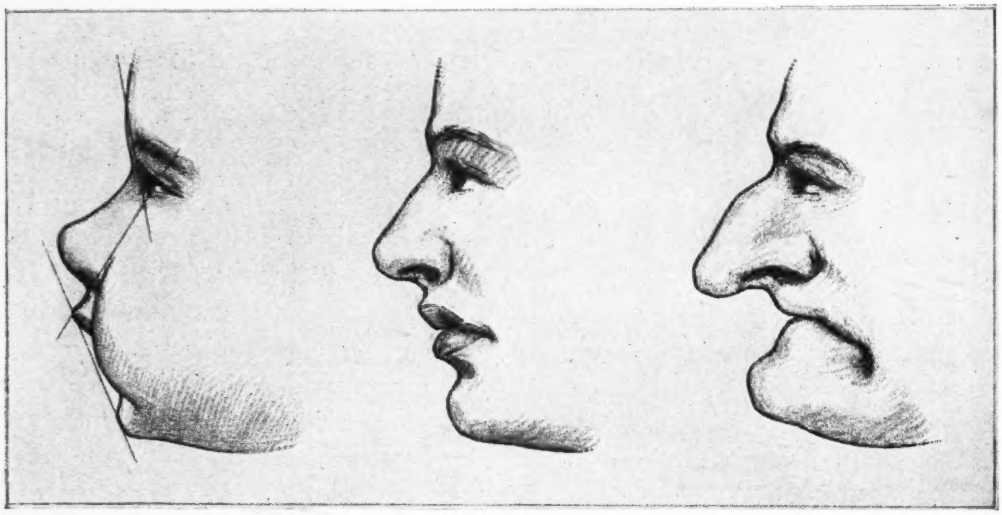
One of the most common complications of malocclusion of the teeth is a marked distortion of the facial lines. Frequently it is the only symptom which induces parents to seek a cure for their child's affliction.

In his *"Expression of the Emotions in Man and Animals"* Darwin demonstrated the unity of the races, and anatomical science has provided us with a fairly accurate description of normal facial development in the individual; but a critical analysis of *abnormal facial types* has hardly begun. A review of the

old literature is a fruitless task, because most of it is devoid of exact methods of investigation. Physiognomic research is largely a record of false conclusions, due perhaps to its too close association with phrenology. Krukenberg remarks that its scientific study began in earnest only ten years ago, and that it is still in its infancy. It therefore seems eminently worth while to attempt a presentation of a certain group of facts with which orthodontists are more or less familiar, but which have not yet gained that wide acknowledgment which their importance merits.

I. Normal Variations of the Head-form.

The human body, with its varied beauty of organization, is one of the most complex structures in nature. Normal variations of its form have long been considered worthy of serious study, and since Darwin's day they have been



A *B* *C*

Fig. 1.—Evolution of the Profile. (*a*) Infancy; (*b*) Maturity; (*c*) Senility.

pursued with a renewed earnestness. Blumenbach, Camper and Prichard were the pioneers in the study of the relation of the teeth and jaws to the facial lines of man.

This phase of scientific inquiry now forms an important division of *anthropology* where, in common with other elaborate methods of classification, it is termed *anthropometry,* the science of human measurements. The comparative study of the skull comprises a subdivision termed *craniometry.* When the measurements are taken from the living head it is termed *cephalometry.* Numerous methods for measuring human features have thus been proposed, and some of them have been sufficiently standardized to win universal acceptance.

In comparing a number of skulls even the beginner experiences little difficulty in detecting differences of shape. "The form of the head is for all racial purposes best measured by what is technically known as the *cephalic index* (Fig. 2). This is simply the breadth of the head above the ears expressed in percentage of its length from forehead to back. Assuming that this length is 100, the width is

expressed as a fraction of it. As the head becomes proportionately broader—that is, more fully rounded viewed from the top down—this cephalic index increases. When it rises above 80, the head is called *brachycephalic;* when it falls

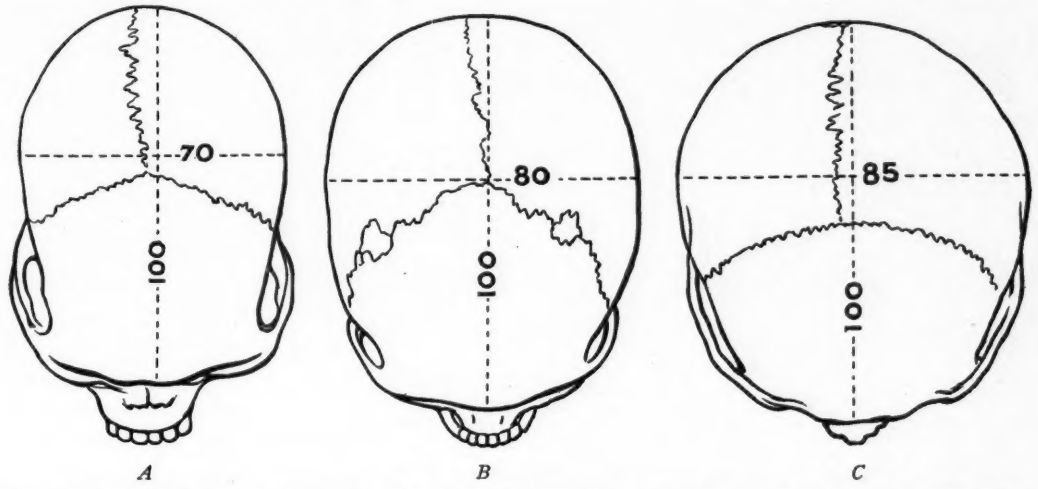


Fig. 2.—Cephalic Index. (*a*) Negro, index 70, dolychocephalic; (*b*) European, index 80, mesocephalic; (*c*) Samoyed, index 85, brachycephalic. (After Tyler.)

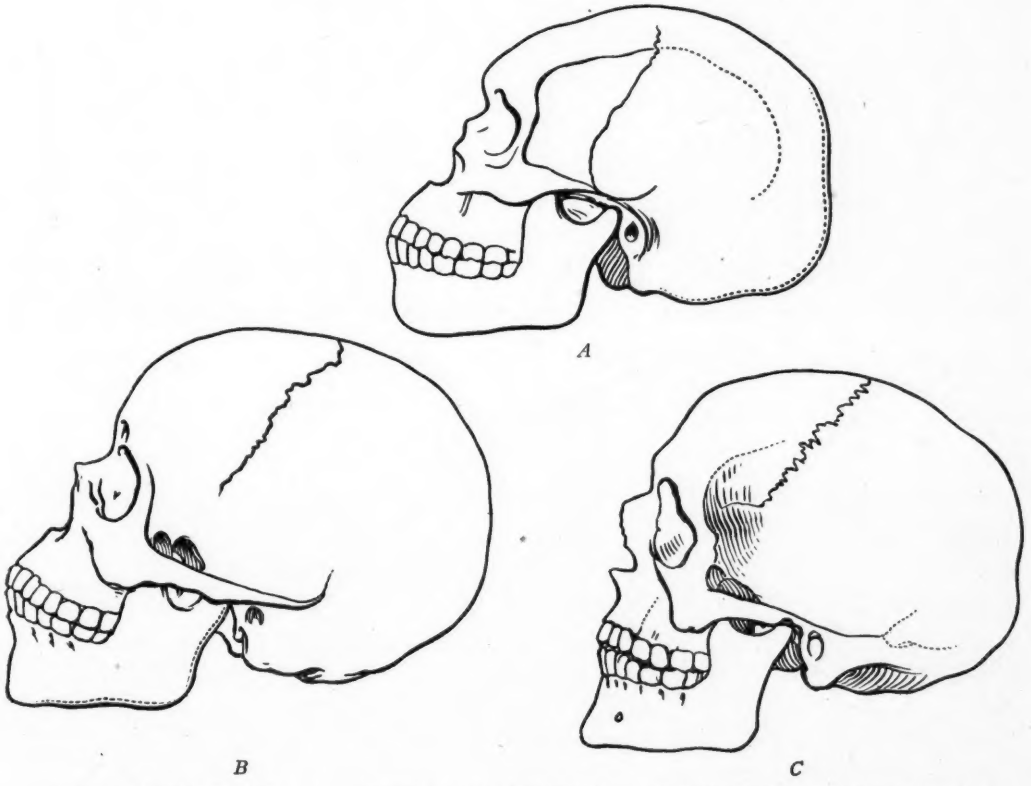


Fig. 3.—Gnathic Index. (*a*) Prognathic; (*b*) Mesognathic; (*c*) Orthognathic. (After Flower.)

below 75, the term *dolychocephalic* is applied to it. Indexes between 75 and 80 are characterized as *mesocephalic."*

Variations in the form of the palate, classified by Turner into *dolichuranic, mesuranic* and *brachyuranic,* are also recognized, as well as variations due to

differences of development in the muscles of mastication. The latter may frequently be recognized in the (a) changeable position of the temporal ridge, (b) the differences in width of the rami of Europeans when compared with those of aborigines, (c) the varying degrees of parallelism of the borders of the rami, and (d) the outward and inward everted angles of the lower jaw, which affect the width of the lower part of the face.

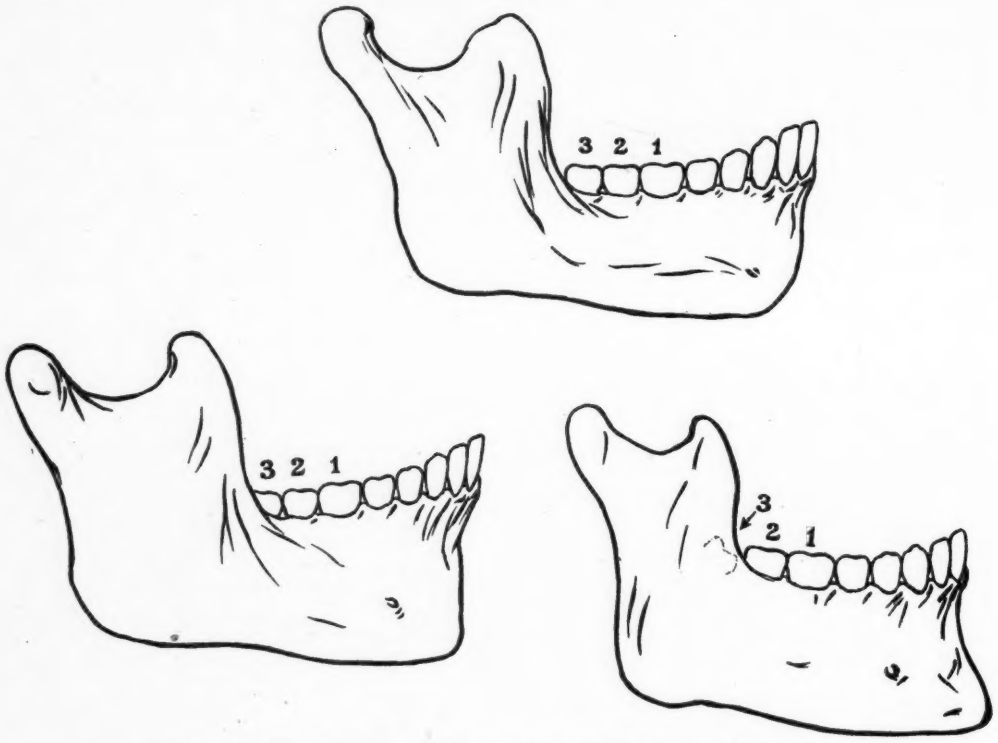


Fig. 4.—Variations in the relative positions of the lower third molars.

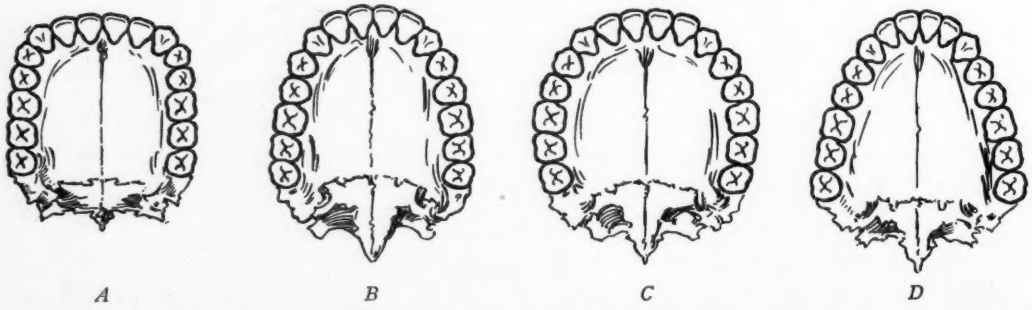
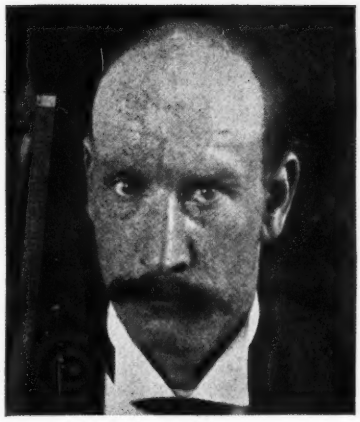


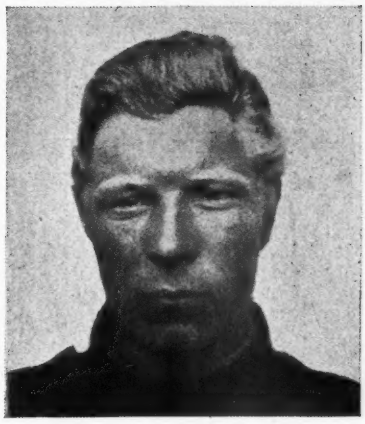
Fig. 5.—Normal Variations of Alignment. (*a*) U-shaped; (*b*) Parabolic; (*c*) Hyperbolic; (*d*) Elliptic. (After Broca.)

II. Normal Variations of Dentition.

The history of the teeth, as explained by comparative odontology with the aid of fossil remains, is one of the most complete as well as interesting narratives which science has ever told; very few departments of knowledge can present a section of the past quite so completely. But like many other organs of the body, the teeth have not escaped the enervating influences which our changing diet and modes of life through centuries of time have imposed.

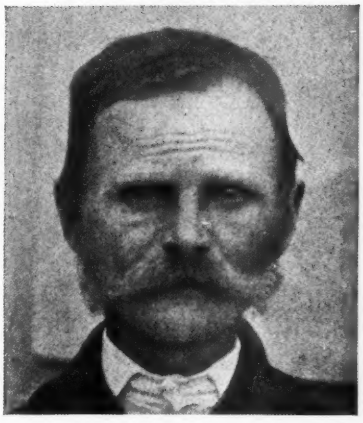


Swiss, Basle. Index 64.

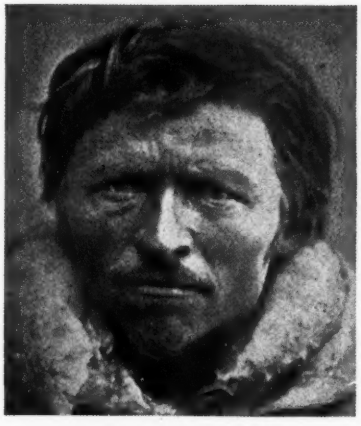


Norwegian, Aamot. Index 75.

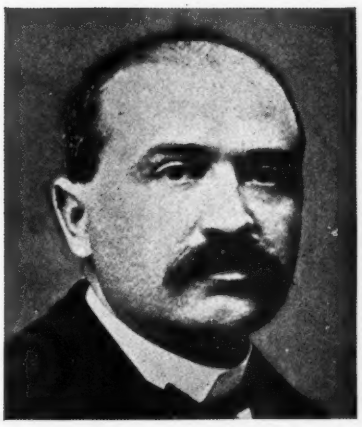
German, Baden. Index 83.



Hungarian, Thorda. Index 88.5.



Lapp, Scandinavia. Index 94.



French, Savoy. Index 96.

Fig. 6.—Illustrating the relation between face-form and head-form. (After Ripley.)

With the aid of Flower's *gnathic index* we are able to determine the relative projection of the teeth and lower part of the face, and to classify the races of mankind into the three groups: *prognathic, mesognathic* and *orthognathic* (Fig. 3). This variation is also noticed in the relative position of the lower

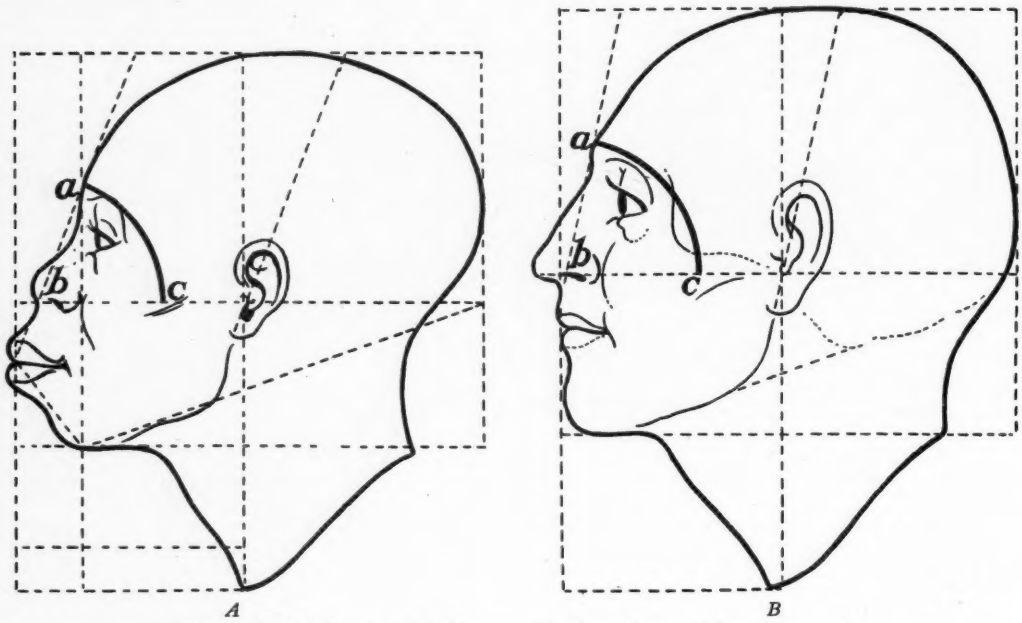


Fig. 7.—Facial Index. (*a*) Negro; (*b*) Caucasian. (After Camper.)

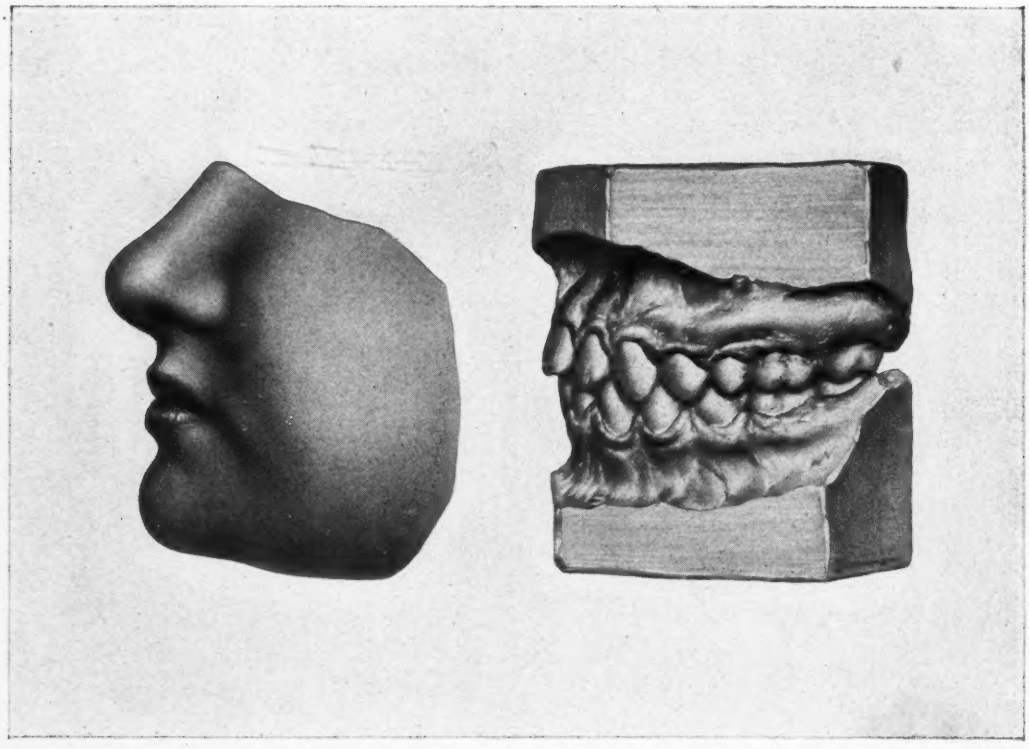


Fig. 8.—Prominent chin, with normal denture.

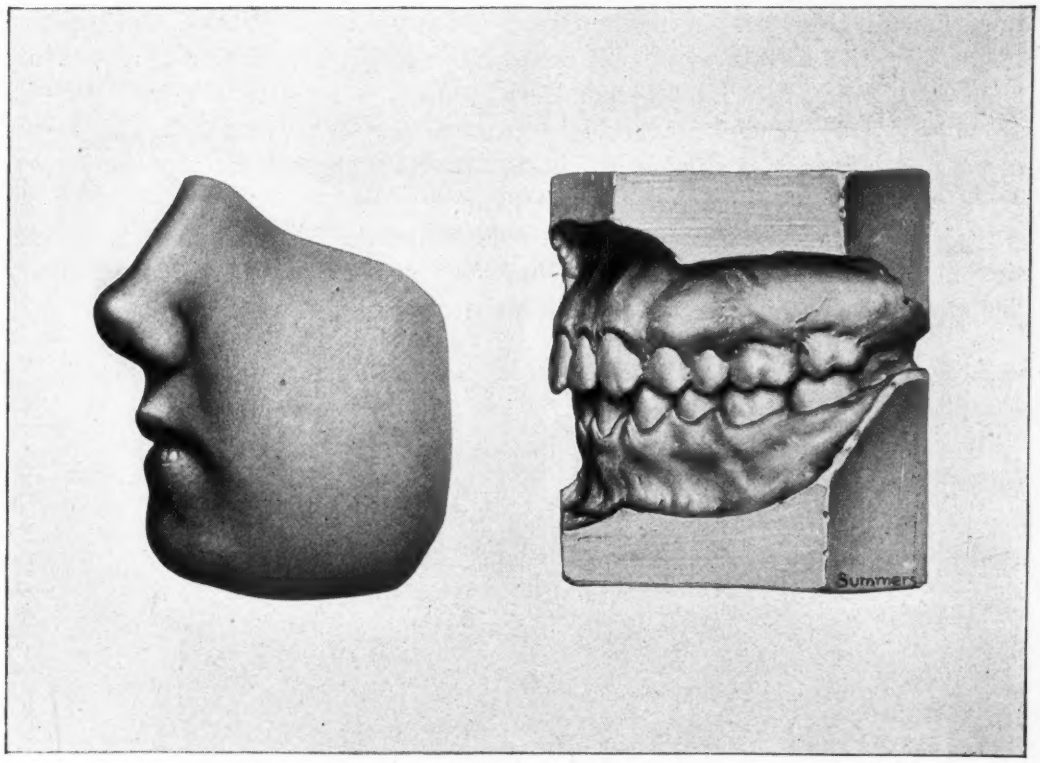


Fig. 9.—Straight chin, with normal denture.

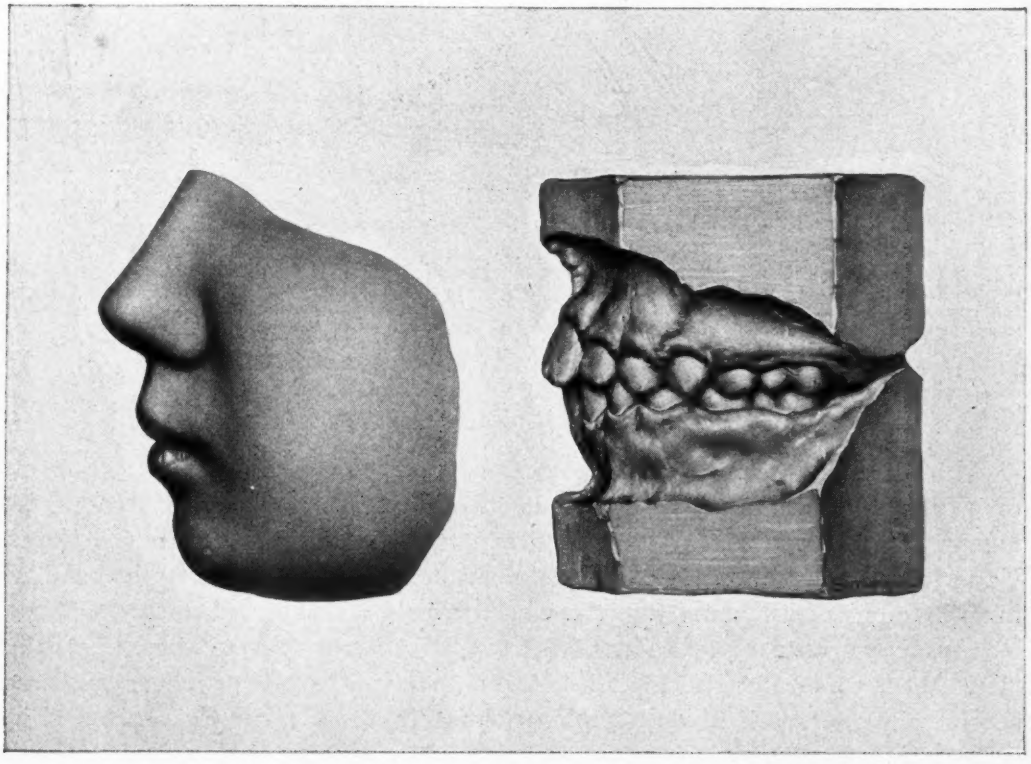


Fig. 10.—Receding chin, with normal denture.

third molars (Fig. 4). With the *dental index* we can determine the "relation of the size of the teeth to that of the skull" and get the three classes termed: *microdont, mesodont* and *megadont.*

The noted French anthropologist, Broca, long ago called attention to the normal variations of alignment of the teeth, and suggested the four types: *hyperbolic, parabolic, elliptic* and *U-shaped* (Fig. 5).

Dr. J. Leon Williams, in a paper read before the National Dental Association in 1910, called our attention to the fact that the width of the maxillary dental arch followed closely the width and length of the zygomatic arches.

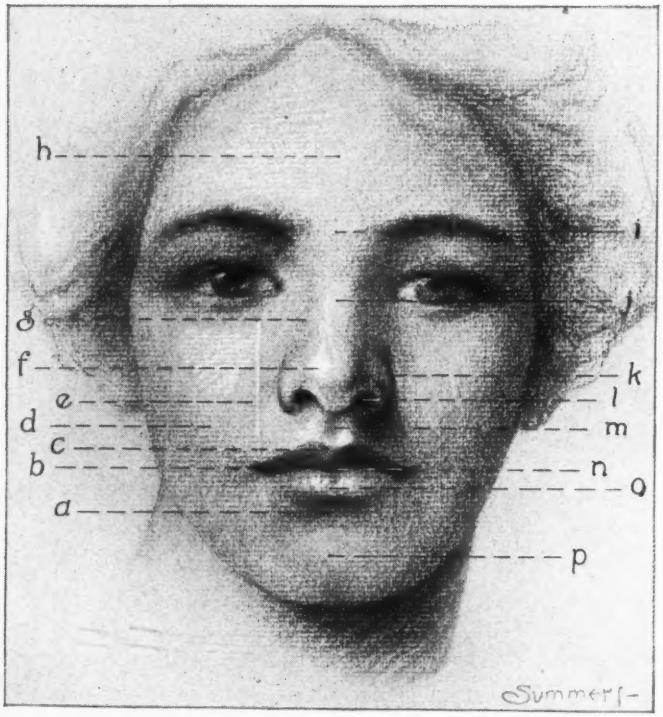


Fig. 11.—Principal features in the face, the relations of which may be altered by orthodontic treatment. Front view. (*a*) mentolabial sulcus, (*b*) angle (angulus oris), (*c*) upper lip, (*d*) cheek (bucca), (*e*) nasolabial sulcus, (*f*) tip (apex nasi), (*g*) base (basis nasi), (*h*) frontal eminence, (*i*) root (radix nasi), (*j*) dorsum (dorsum nasi), (*k*) ala (ala nasi), (*l*) nostril (nares), (*m*) philtrum, (*n*) aperture (rima oris), (*o*) lower lip, (*p*) chin (mentum).

III. Normal Facial Types.

It is a matter of ordinary observation that every face presents lineaments of character which stamp it with individuality; probably no other part of the human body shows so marked a tendency to variate in features and contour. Under normal conditions, the various elements of the face frequently combine in so harmonious a manner that the whole reveals a striking symmetry.

In his work on "The Races of Europe," Professor Ripley adopts the rule: "long head, oval face; short head and round face. In proportion as the head becomes broader back of the temples, the face appears relatively shorter (Fig. 6). Only a few examples of widespread disharmonism as it is called, between head and face are known. Among these are the Greenland Eskimos, notwith-

standing the fact that they are almost the longest-headed race known. The Aborigines of Tasmania are also *disharmonic* to a like degree, most other peoples of the earth showing an agreement between facial proportions and those of the head which is sufficiently close to suggest a relation of cause and effect. In Europe, disharmonism is very infrequent among the living populations. At times disharmonism arises in mixed types, the product of a cross between a broad and a long-headed race, wherein the one element contributes the head-form while the other persists rather in the facial proportions. Such combinations are apt to occur among the Swiss, lying as they do at the ethnic crossroads of the continent."

A widely used method of measurement applicable to the profile is that sug-

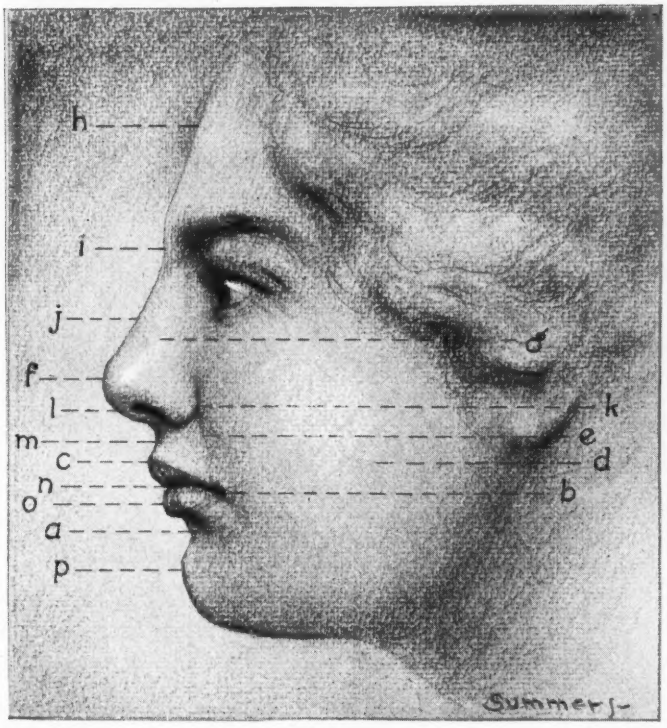


Fig. 12.—Principal features of the face. Side view. (*a*) Mentolabial sulcus, (*b*) angle (angulus oris), (*c*) upper lip, (*d*) cheek (bucca), (*e*) nasolabial sulcus, (*f*) tip (apex nasi), (*g*) base (basis nasi), (*h*) frontal eminence, (*i*) root (radrix nasi), (*k*) ala (ala nasi), (*l*) nostril (nares), (*m*) philtrum, (*n*) aperture (rima oris), (*o*) lower lip, (*p*) chin (mentum).

gested by the Dutch anatomist, Peter Camper, and technically known as the *facial angle*. "This gave an angle of about 20° for a dog, 85° for an Australian black, 95° for a European, and the Greeks used an angle of 100° or more to express their ideal of beauty and of intellectual power" (Fig. 7).

Deviations of form in the bony structure of the chin (which is closely related to the teeth and largely influenced by their growth) are naturally of compelling interest to the orthodontist. The normal variations of form of the symphysian angle result in the three types known as the *prominent, straight* and *receding chin*. These are frequently associated with a normal, as well as abnormal, denture. When a prominent, or receding, chin is found as a complica-

tion of malocclusion, the orthodontist finds himself confronted with one of the most difficult problems with which he has to deal (Figs. 8, 9, and 10).

Normal variations of form in the muscles of the lips, cheek and tongue are also recognized, as well as deviations in the size of the oral aperture, termed *microstomia* and *macrostomia.* The relation of the lip line to the occlusal plane of the teeth varies considerably, and it is also a matter of common knowledge that so prominent a feature of the face as the nose varies greatly in size and form, even within normal limits. Again, no two beings have eyes that are alike, for these, too, vary greatly in their color, size and position.

The principal features of the face which are the special concern of the orthodontist are shown in Figs. 11 and 12. The relative place which each of these features ought to occupy constitutes the student's first object of study. Having secured in his mind the position and form of each part, he comes to the second problem, viz., *The rearrangement of malplaced and malformed parts* in the faces of his patients. That this can frequently be done is one of the many notable achievements of the modern art of orthodontics.

(To be continued.)

THE TEETH AS FACTORS IN THE ECONOMY OF THE ANIMAL KINGDOM

By Martin Dewey, D.D.S., M.D., Kansas City, Mo.

Professor of Dental Anatomy and Orthodontia, Kansas City Dental College; President of the Dewey School of Orthodontia.

THE conviction has often been forced on those engaged in the practice of orthodontia that the majority of individuals seeking the service of an orthodontist for the treatment of malocclusion in children do so with the idea of improving the facial beauty of the child. It is very seldom that the orthodontist is called on to correct a case of malocclusion for the purpose of increasing the masticating efficiency of the teeth. It is also true that the majority of people who seek the service of a dentist do so for the purpose of alleviating pain instead of increasing the masticating efficiency of the dental apparatus. In fact, those who are engaged in the construction of crowns and bridges are often compelled to have a long argument with the patient in regard to the necessity of having a bridge inserted before the patient will consent to have such work done. In other words, the majority of people who engage the service of the dentist or orthodontist do so with the idea of being relieved of pain by the one or having something done by the other which will increase their facial beauty. This idea is entirely wrong, for the aim of all dental operations, whether of an orthodontic or other character should be to increase the masticating efficiency of the dental apparatus. While it is apparent to every one practicing orthodontia or dentistry that teeth in malocclusion do not perform their function as well as when in normal occlusion, nevertheless it is probable that few people have considered the important factor the teeth have played in

the preservation of animal life. Very few people realize that the animal kingdom, as we find it today, would not exist if it were not for the teeth. We often speak of the intricate workings of the brain, the wonderful effects of the human mind, and are even impressed with the intelligence displayed by certain lower animals, yet comparatively few people realize that the brain would never have developed, the human mind would never have been so powerful, even the lower animals would not exist as they are found today, if it had not been for the dental apparatus. There probably has been no one other set of organs which

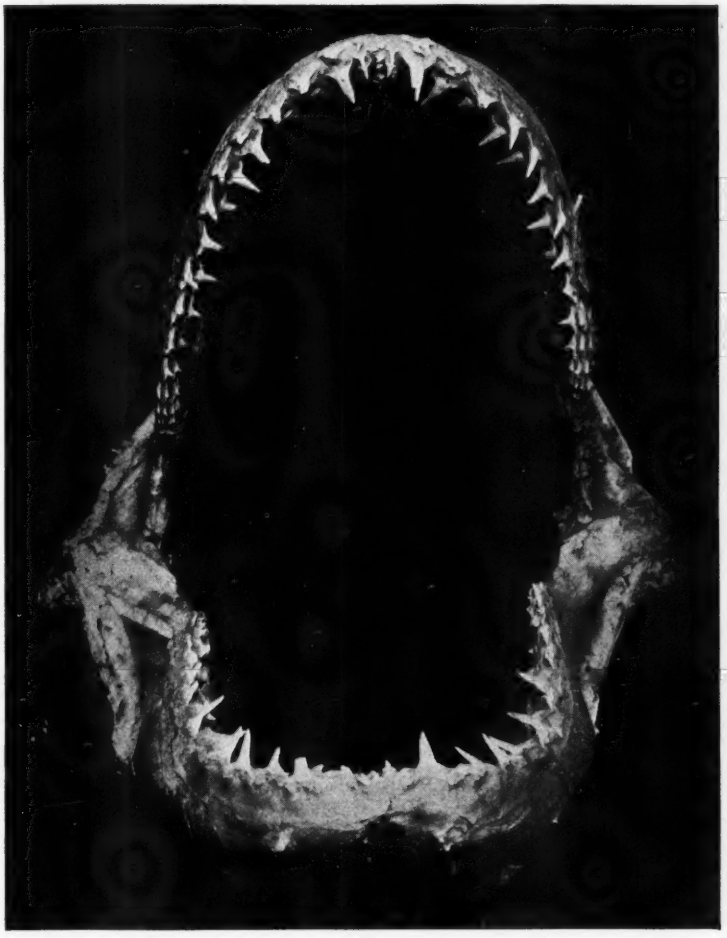


Fig. 1.—Jaws of Shark (species unknown).

has been to such an extent responsible for the development of the animal kingdom, or which has played such an important part in the different kinds of animal life, as have the teeth. It is a fact that comparatively few persons sufficiently appreciate their dental apparatus, and probably the majority of the lower animals are not troubled about "oral hygiene" for, fortunately, most of them are not subject to dental ills if they are living in the natural environment in which their teeth developed. It may be taken for granted that, without the development of the dental apparatus in the various animals as we find it today, such animals would not be in existence. In fact, without the development of

the dental apparatus, animal life would not increase very much beyond the single-cell forms. The animal life in such case would necessarily have remained in the elementary stage, or would have been represented by such animals as we find today that are devoid of teeth, and which are of very simple structure, being composed of only a few cells, and some of them composed of only a single cell.

If we begin with the study of those organisms which are composed of very simple cell masses, whose alimentary tract consists of a simple sack with a single opening, we will find even at this stage that the cells surrounding the oral opening become larger, and are the beginning of the development of the

Fig. 2.—Teeth of Pickerel (*Esox lucius*), showing teeth on vomer and palates.

dental apparatus. As we approach the insect life we do not find, as a rule, true teeth, but nature has made a provision for a dental apparatus by supplying the animal with serrated jaws, which are analogous to teeth, with which he is able to secure his food, and with which he is able to perform the secondary function of the teeth—namely, that of defense and offense. The invertebrate, as a rule, are devoid of true teeth, but when we pass to the vertebrate we find teeth are the common rule. In fact, in the lower vertebrate we find that the dental apparatus reaches a high degree of perfection before any of the other organs attain a similar degree of completion. In the lower forms of fish, which are represented by the cartilaginous species, of which the shark is an example, we find a dental apparatus (Fig. 1) which is particularly suited to the animal's needs, and which apparatus has largely been responsible for the continued ex-

istence of that primitive animal even up to the present time, when it is forced to live in an environment which tends to destroy it in great numbers. The dental apparatus of the shark is particularly efficient for its needs because it is composed of a large number of teeth. These teeth are attached by fibrous membrane, but are of continuous succession, and it is this continuous succession and rapid development that has enabled the dental apparatus to serve the animal so efficiently. The teeth of a shark are simply modified placoid scales, which have been carried into the oral cavity by a process of development and have become larger to serve the needs of the animal. We may consider the dental apparatus of the shark as representing one of the first set of teeth used for the economy of the fish and which were necessary for its existence.

Fig. 3.—Sargus, incisor-form teeth ankylosed to jaw. Posterior teeth for crushing. Anterior teeth for incision. Heterodont. (Author's collection—Roentgenogram by Dr. E. H. Skinner.)

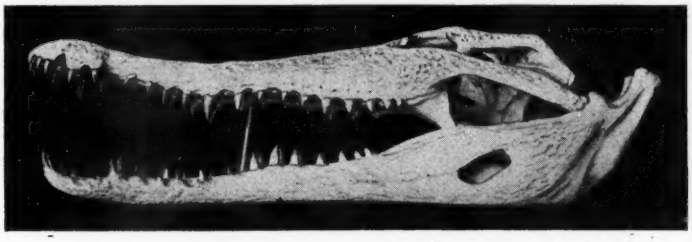


Fig. 4.—Teeth of *Crocodilus niloticus.*

In various bony fish we find the dental apparatus has reached a higher state of perfection in that certain teeth have become specialized and have been made to perform a certain definite function. As a result, the economic condition of the animal has been greatly increased, and it has been able to utilize a class of food which cannot be consumed by the shark. In the pickerel (Fig. 2) we find teeth placed upon the palate and vomer to perform the function of prehension and deglutition, while the teeth on the mandible perform the function of prehension. Those who indulge in the sport of catching pickerel may never have understood that the peculiar habits of the animal were due to the teeth it possessed. If toothless pickerel were developed, the tactics of angling for the fish would have to be changed as the habits of the toothless pickerel would be entirely altered, and it would be forced to eat a different kind of food.

In fact, the very nature of every animal depends on the teeth. Fig. 3 shows a dental apparatus of the sargus, whose teeth are decidedly different from those of the pickerel, and which necessarily leads a very different life and eats other kinds of food.

In an economic consideration of the teeth as a factor in the production of and influence on animal life, we leave the fish and pass to the reptiles, of which there are many kinds. Investigations inform us that ages ago the world was largely inhabited by enormous reptiles, whose dental apparatus was very similar to that of the alligator and crocodile of today. The dental apparatus of the alligator and crocodile is not very efficient, but the animal has managed to exist

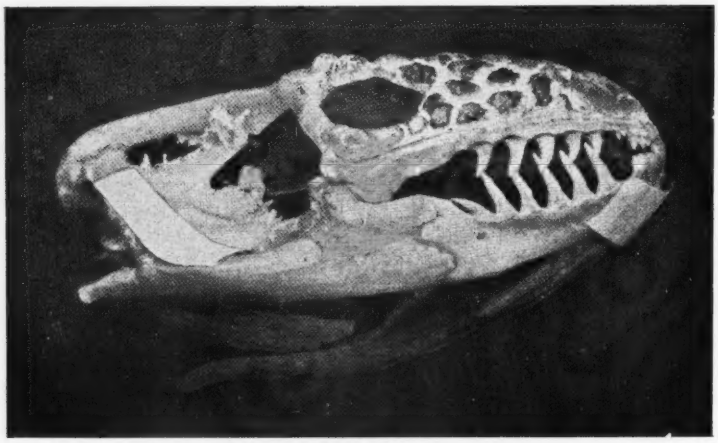


Fig. 5.—Teeth of Gila Monster (*Heloderma*).

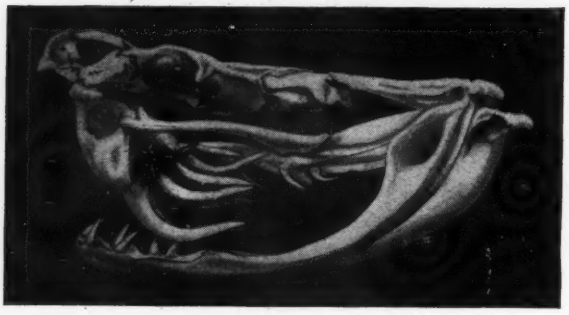


Fig. 6.—Teeth of Rattlesnake (Crotalus adamanteus). Highly specialized poison fangs.

because it has lived in certain haunts that are difficult for man to explore. The development of their strong exoskeleton has made them immune to the attack of most animals except man, and therefore they still exist in large numbers. The dental apparatus of the alligator and crocodile, while not so efficient as that of some of the other reptiles, is, however, suited to their particular needs, and is of sufficient utility for the class of food found in the habitats of those animals. Other animals closely related to the alligator and crocodile, such as the various kinds of lizards, have also adapted themselves to certain environments and their dental apparatus has likewise become of economic importance. We refer to the gila monster (Fig. 5) which inhabits the desert, and has a dental apparatus suited to its particular needs in its environments. Of the other rep-

tiles, we may refer to the snakes, which are poisonous and nonpoisonous, both kinds having dental apparatus that is very efficient. Of course, the poisonous snake possesses a dental apparatus that is specialized to a greater extent than that of the nonpoisonous, and the abhorence in which the entire snake family is held is based on the characteristics borne by the poisonous snake. The dental apparatus of the poisonous snake is efficient to a high degree (Fig. 6) and seems to be developed to a condition of effective preparedness, with the result that all of its nonpoisonous cousins are placed in the same category and are made to unjustly suffer for its sins. In America we have only two families

Fig. 7.—Teeth of *Python regius,* used for prehension and deglutition.

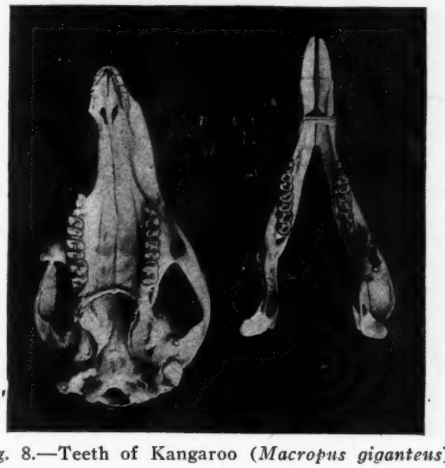


Fig. 8.—Teeth of Kangaroo (*Macropus giganteus*).

of poisonous snakes that exist to any considerable extent today—namely, the rattlesnake and the copperhead. We have many varieties of nonpoisonous snakes that possess dental apparatuses which are efficient for securing food and which are necessary for the life of the animal. Nonpoisonous snakes may possess a large number of teeth, which are used for the functions of deglutition and prehension (Fig. 7). The poisonous snake as shown in Fig. 6, has fewer teeth, but their efficiency is increased by continuous succession, as the animal is never without a set. Nature has provided the lower animals with a dental apparatus which suits their needs, and, while it may be defective in some respects in certain animals, it has enabled the animals to exist during their allotted terms of lives.

We find some animals are devoid of teeth, but they possess analogous apparatuses that are highly developed. We refer to the beaks of various birds, and these beaks may be considered to be more highly specialized, from a dental standpoint, than some of the dental apparatuses of lower animals, as geological remains show that the earlier types of birds possessed teeth.

Of the higher animals we may mention the marsupials, a class of animals that have ceased developing at a stage which most other animals passed years ago. From a dental standpoint, however, the marsupials are very well supplied, and, in fact, are better supplied than some of the mammals. The kangaroos of Australia (Fig. 8) possess a dental apparatus which is a highly specialized herbivorous type, and enables them to lead a life and secure food where it would be difficult for other herbivorous animals, or even rodents, to exist. The arrangement of the upper and lower incisors makes it possible for the animal to obtain food where such animals as the sheep and cow would starve, and presents a case where the very existence of the animal depends on the dental apparatus.

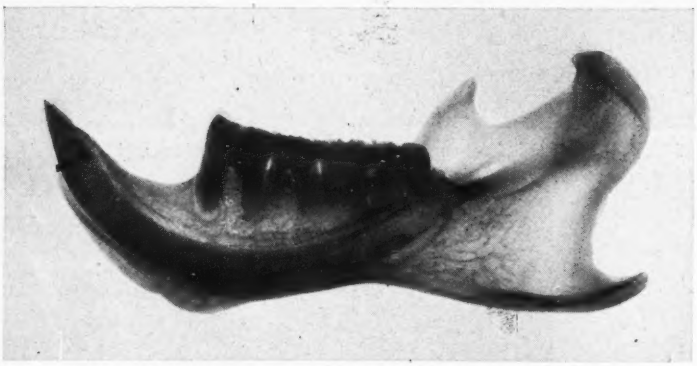


Fig. 9.—Roentgenogram of jaw of Woodchuck (*Arctomys monax*). (By Dr. E. H. Skinner.)

The dental organs of the American opossum (Fig. 9) are also very efficient, but in this case the teeth, as well as other portions of the animals, are passing through an evolutionary stage, and represent a condition between the carnivorous and herbivorous dentition. In fact, some of the teeth of the opossum resemble those of the carnivorous animal, while other teeth resemble those of the herbivorous. The specialization of the dental apparatus of an animal does not necessarily depend on whether it is a marsupial or whether the young are born in the nature stage, for, as has been stated, the teeth of the kangaroo are more highly specialized than those of some of the higher mammals. There is a little marsupial in Madagascar that resembles a squirrel and has a rodent dentition—that is, the animal possesses large scalpriform incisors, which grow from persistent germs, and it is the peculiar teeth of the animal which enable it to secure a diet which the other marsupials cannot obtain. Rodents represent a class of animals which, from a dental standpoint, is very interesting, for the very existence of practically all rodents depends on their dental apparatus. We cannot imagine that any rodent would exist very long if it were to lose the incisors, as they are the more important teeth. Of course, the loss of the molars would be inconvenient, and

their absence would probably hasten the death of the animal. More or less is known about the wonderful habits of the beaver (Fig. 10) and the great intellect which the animal displays, but this intellect would be absolutely useless and the animal would be extinct as a class if it were not for its peculiar teeth. The teeth are useful not only as organs for securing food, but also as tools with which to do the particular type of building for which they are noted. In many of our American cities some of the parks are the abiding places of a large

Fig. 10.—Teeth of Beaver (*Castor canadensis*). Side view.

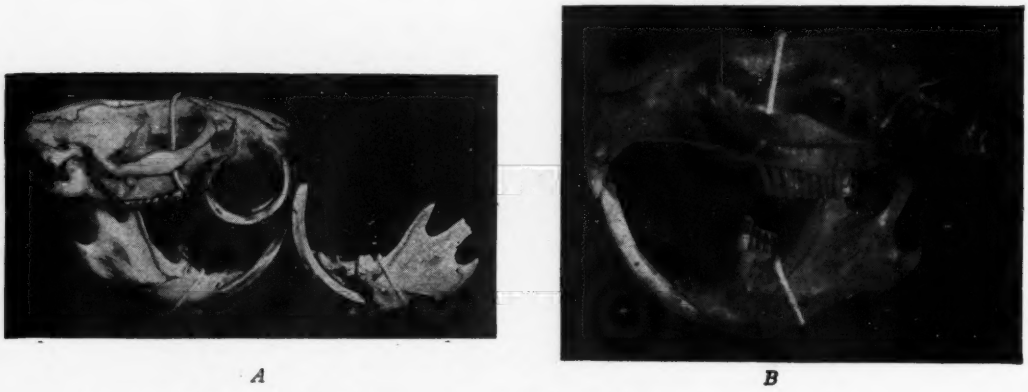
Fig. 11.—Teeth of Squirrel (*Scurius niger*).

number of squirrels, which seems to be the only animal that is able to exist with any degree of safety in those surroundings, and this is because the squirrel (Fig. 11) is able to obtain food in a way that is denied the majority of other animals. The squirrel is able to open nuts, that are found on some trees in the parks it frequents, and the formation of its dental organs has enabled it to take up abodes where no other animals could exist.

The statement has been made that, should certain animals lose their teeth —or by some means lose the use of their teeth—they would soon die, and an example of such an occurrence is illustrated in Fig. 12. Here is shown the

skull of a squirrel which met with an accident, and the central incisors, failing to occlude, continued to grow from a persistent pulp until the animal starved to death as a result of the accident.

Of the carnivorous animals the lion (Fig. 13) is a good example. The position which the lion occupies in the animal kingdom, both actually and theoretically, being called the king of beasts, is because of the dental apparatus which it possesses. The carnivorous animals do not possess certain teeth because they are carnivorous, but, conversely, they are carnivorous because they possess that type of teeth. Just what has been responsible for the development of the dental apparatus of the carnivorous animals will probably never be known, but from some cause such a set of teeth has developed, and consequently the entire nature of the animal must conform to the teeth. We are not prepared to state positively that a certain dental apparatus has developed to meet the particular needs of the animal, but we will say that, after it has once developed,



A *B*

Fig. 12.—Skulls of Squirrels, showing excessive growth of incisors as a result of injury.

the animal is dependent on it for its continued existence. In other words, if a carnivorous animal were to lose the canine teeth, it would die in a short time. The teeth of the herbivorous animals (Fig. 14) are just as important for their purpose as the teeth of the carnivorous animals, and have been specialized in a manner that compels the animal to follow a certain habit. We are reminded of the story of the dog in the manger, which could not eat the hay, and, because he could not eat it, refused to let the ox have it, which may have made the impression as being a fable, but which nevertheless has a certain scientific bearing when viewed from a scientific standpoint.

These few examples in regard to the teeth of certain animals will, we believe, enable the reader to understand what we mean by the statement that the teeth are economical factors in the preservation of animal life. If, therefore, the teeth have been so important a factor to the lower animals, the question naturally arises how much of a factor are they in the economy of the human family today? We are of the opinion that they play a much greater part in the individual than has been attributed to them, and we believe that an examination of the records of men who have attained great success today would disclose the fact that they obtained their greatest achievements during the time

when their dental apparatus was in the best condition. We can make the statement with little fear of contradiction that an individual after he has lost his teeth is making a losing fight. We believe that if in the case of two boys each twelve years of age and of the same physical development and same intelligence, one should have all his teeth extracted, and even supplied with the best artificial denture, the one with the artificial teeth would be a very poor second to the individual with natural teeth. In fact, we feel that it is impos-

Fig. 13.—Teeth of Mountain Lion. Side view.

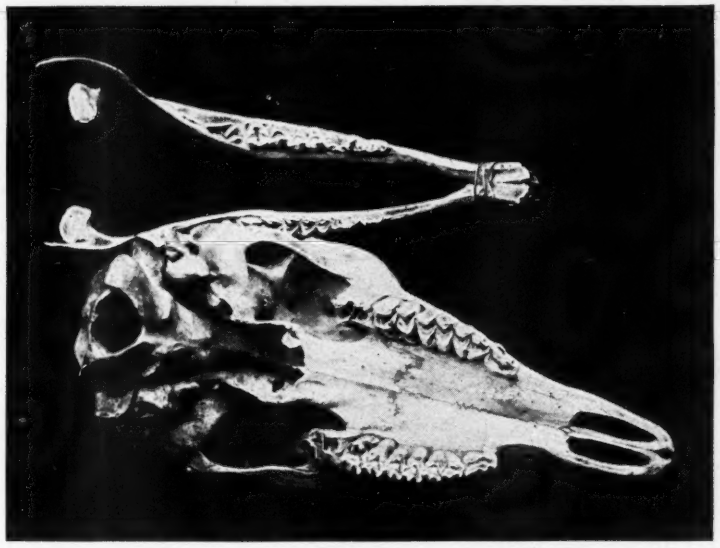


Fig. 14.—Occlusal view of teeth of Antelope (species unknown).

sible for an individual to reach his highest degree of efficiency unless all of his teeth are in normal occlusion and performing their proper function. Even the loss of one tooth will impair the masticating efficiency of the dental apparatus and this impairment of the dental apparatus will correspondingly lessen the efficiency of the individual. In our observation of people, if we find a man 70 years old who possesses all of his natural teeth, he will be an individual who is vigorous and who possesses physical and mental strength far superior to another man of 70 years who lost all his teeth at the age of 40.

If, as explained above, the teeth have played such an important part in the development of lower animals, it is logical to conclude that they have been an important factor in the development of man, and, if they have been such essential organs to men's progress, it is illogical to suppose that in the course of time they will lose their efficiency and cease to be of economic importance in the life of the human being. While it is a fact that individuals can live without teeth (they can be supplied with certain artificial substances) it is our opinion that the individual who possesses artificial teeth will be at a disadvantage when compared with the individual with a normal set of teeth. It therefore becomes our duty to impress our patients with the fact that malocclusions should be treated, not on account of the esthetic feature, but because of the importance of well-arranged teeth as organs of mastication, and the influence which they will have on the physical and mental development of the individual.

ORTHODONTIA—ITS PLACE IN DENTAL EDUCATION*

By Lawrence W. Baker, D.M.D.

Assistant Professor of Orthodontia, Harvard Dental School, Boston, Mass.

IT is a generally observed fact that the most progressive and active minds in our profession are interested in the training of those who are to enter our ranks, in other words, they are interested in the advancement of dental education. Therefore I thought that my fellow graduates of the Angle School might be interested to hear something about the methods and see some results of these methods in teaching orthodontia in the Dental School of Harvard University.

At the very outset I would like to state the aims of the Orthodontia Department. While it is not our purpose to educate, at least in the regular curriculum, specialists in orthodontia, we do regard the study of orthodontia as one of the fundamentals in teaching the modern student of dentistry. The study of orthodontia links together the student's knowledge of anatomy, histology and embryology as no other dental study can, for these subjects are the very structural elements of the theory of orthodontia. The student's mental horizon is furthermore broadened by a knowledge of comparative dental anatomy, that fascinating study which leads the diligent student on to a keener appreciation of the wonderful variations and architectural plans of the human types, gained through the study of the dental systems of the lower animals with their marvelous physiological adaptations to the foods and habits of the species; all of which reflect the great principles of evolution.

Practical orthodontia is also very important in revealing to the student the wonders of the dental apparatus, for here this most intricate piece of nature's work is studied in its entirety, whereas in the various studies pertaining to operative and mechanical dentistry the students' attention is so focused on some manipulative process that they are apt to consider the dental system as made up of separate units, the relation of these units, one to another is lost sight of

*Read before the Eastern Association of Graduates of the Angle School of Orthodontia, May 20, 1915.

and it is only through practical orthodontia, only by transforming the malformed dental arches to the normal, that the student can begin to appreciate the relation and interrelation of these dental units in that great equilibrium, normal occlusion.

Indeed this transformation of these extreme malocclusal forces (examples of which I propose to present soon) to the normal, shows the student, in a most striking manner, the important and close relationship of the reaction of these occlusal forces on the development of the skull as a whole.

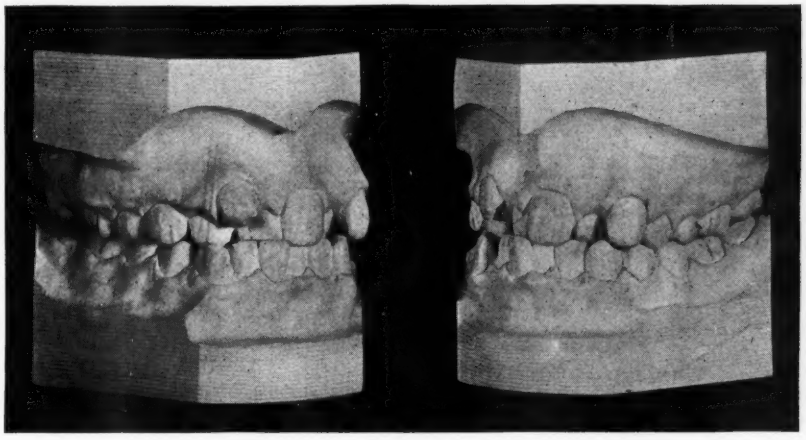


Fig. 1.

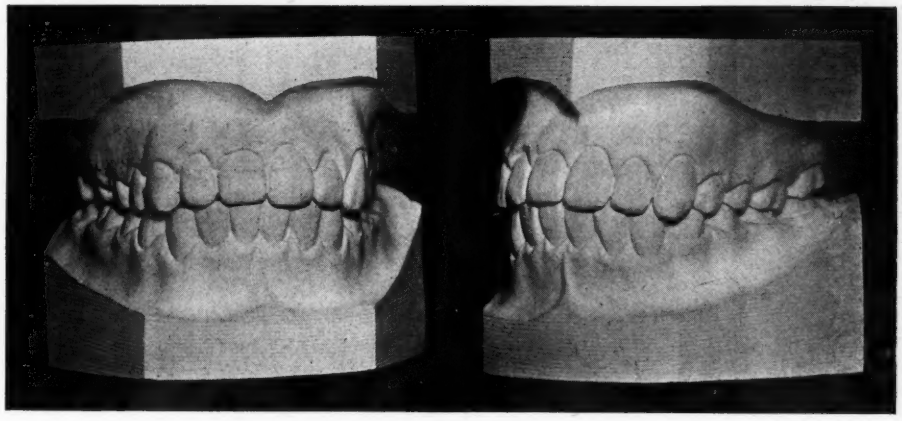


Fig. 2.

Practical orthodontia, the modeling of ugly and inharmonious facial lines to lines of grace and harmony does much towards training the student's sense of art and proportion and should awaken in him keen love for the beautiful, while the technic and clinical sides of orthodontia, dealing as they do with so many delicate forces and such intricate manipulative processes, unconsciously brings out to a remarkable degree the student's manipulative judgment and ability and at the same time trains those qualities so essential to success in practice, namely, patience and perseverance.

So in teaching this subject we strive to do so in a broad way. In fact it

is my fixed belief that the theory and practice of modern orthodontia does more to develop the student's personal skill, more to train his eye, his hand, and to inculcate good sound deductive reasoning than any other one dental study.

It must be borne in mind that I am discussing the subject from the standpoint of educating the student of general dentistry and not the specialist in orthodontia. I am firmly convinced, as I know every one of my fellow graduates of the Angle School is, that to train the true orthodontist, to educate men to practice and advance this most exacting science, the student should first be a selected man, one who has shown in the general course in orthodontia

Fig. 3.

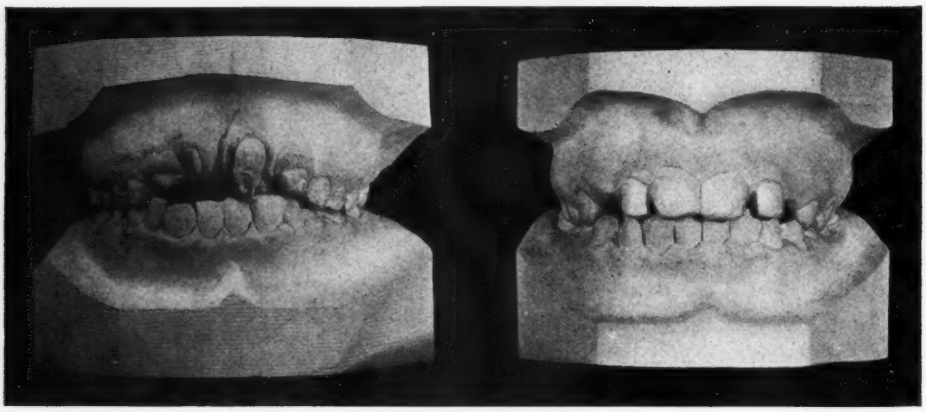


Fig. 4.

that he is fitted, both mentally and temperamentally, to take up this skillful and patient work. Then these "sifted few" should be trained, both in the subject of orthodontia as well as in the collateral sciences, and this training should be presented to the student by skilled experts, so that the scientific knowledge of the world we may say is focused on orthodontia—this in my opinion is the best way to impart the spirit of orthodontia and to foster the love of science and research.

So much for a general consideration, we will now turn our attention to the practical. The questions you will naturally ask are: "Can results be obtained by general students of dentistry? Should practical orthodontia have a place in

the general curriculum?" These questions I will allow you to answer for yourselves after reviewing a few cases, the work of students under instruction, from the clinic of the Harvard Dental School.

Case I.—Fig. 1[1] illustrates the first case which I wish to present for your consideration—a difficult Class I case. One which would test the skill of a most experienced orthodontist.

Fig. 2 shows the student's result, obtained with the classical expansion arch appliance.[2] Not only did he render a real service to the patient, but he also received himself a great deal of educational value. Skilled orthodontists well know the concentration, and the delicate control of the many applied forces necessary to bring about such a result. This work is a striking example of what

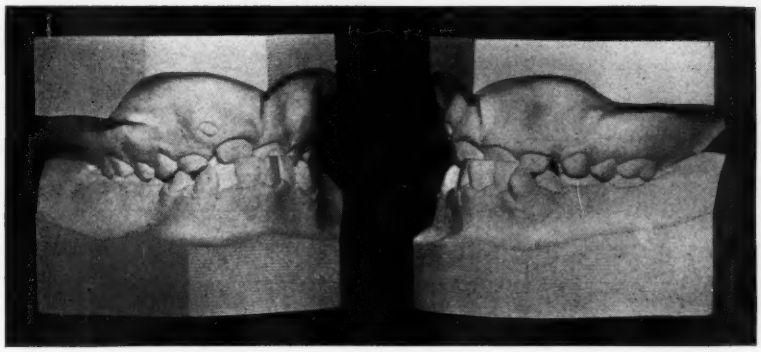


Fig. 5.

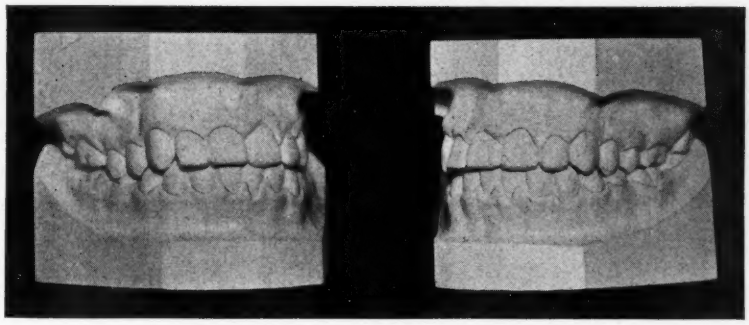


Fig. 6.

has been said regarding the value of practical orthodontia in training the student's mental faculties.

The palatal aspects of the upper arch are shown in Fig. 3.

Case II.—Fig. 4 shows quite an unusual type of a Class I case before and after treatment. Observe that the mesial aspect of the left central incisor presents itself anteriorly, and as its mate erupted it did so in a precisely similar manner.

While treating this case the student became so enthusiastic over orthodontia

[1]As a point of accuracy it must be stated that artistically these models have been improved upon, however the anatomical parts have not been altered and faithfully show the work of the students.

[2]The expansion arch principle was employed in the treatment of all the cases here presented.

that he became determined to be a specialist in this field of work and he is now one of us.

Case III.—Fig. 5 is a most interesting study in the forces of occlusion, for the five cardinal principles which accompany normal occlusion have been completely overthrown.

The result (Fig. 6) clearly shows the skilled orthodontist that the fundamental laws of occlusion must have been thoroughly and deeply inculcated into the student's mind, and furthermore that to achieve this truly beautiful piece of work the student must have had indelibly stamped on his mind those five great cardinal principles of normal occlusion. The student well knew that

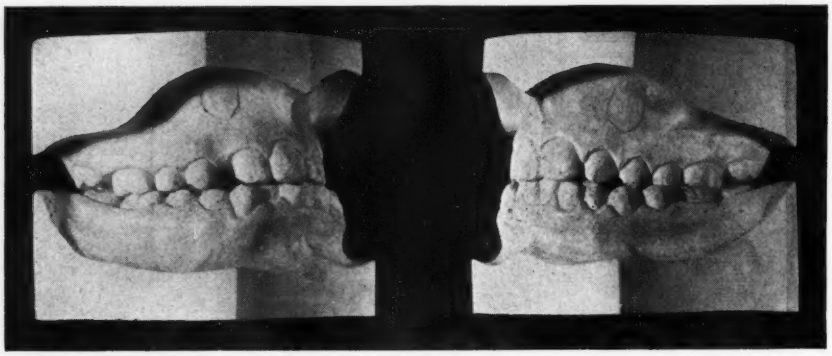


Fig. 7.

Fig. 8.

Fig. 9.

normal occlusion signifies: first, maximum utility, second, that normal occlusion means the establishment of nature's laws of self-cleansing, third, that normal occlusion brings about normal bone growth, fourth, that normal occlusion is accompanied by normal facial lines and lastly, but not least, that the establishment of normal occlusion brings about that ever sought equilibrium of the occlusal forces—nature's retainer.

Case IV.—Fig. 7 was an unusually interesting one from the teaching standpoint. In the first place the students could plainly see that the impaction of both the superior cuspid teeth caused an arrest in the development of the superior maxillary bones and this skeletal deformity caused a consequent inharmonious development of the facial lines.

Secondly, a certain amount of knowledge of radiography was necessary for a complete diagnosis. The position of the right cuspid was easily diagnosed

without the aid of the x-ray, for the characteristic swelling of the bone showed that it lay palatally to the dental arch; but there was no indication of the presence of the left cuspid whatsoever as it was so deeply embedded. However

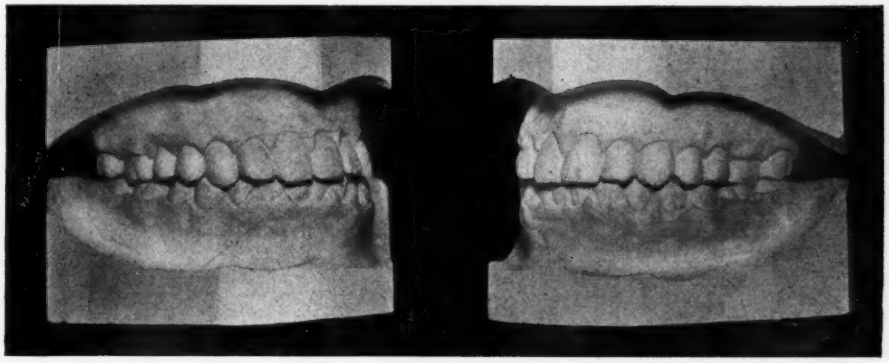


Fig. 10.

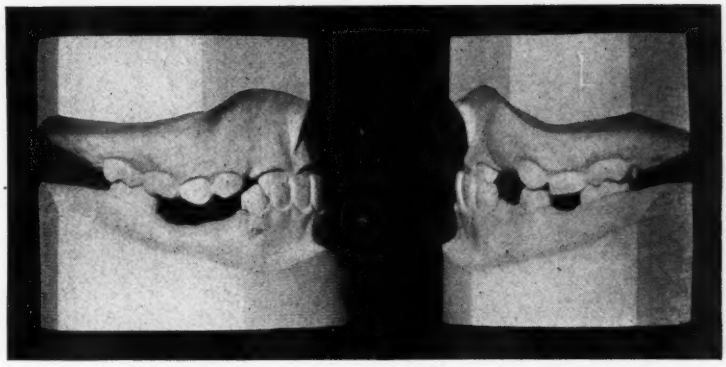


Fig. 11.

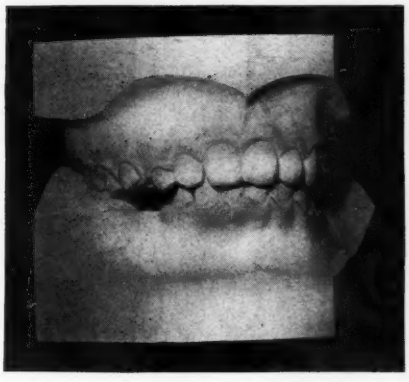


Fig. 12.

the x-ray revealed its presence as shown in Fig. 8. The arch was expanded and thus space was made for the missing unit. Later a skiagraph revealed, as we see in Fig. 9, that the tooth had righted itself and was descending to place. Fig. 10 shows how intelligently the student guided it into correct position. The right aspect of the completed case shows also that the impacted cuspid has on this side been successfully brought to the proper place.

Case V.—In Figs. 11 and 12 still another Class I case is presented for your consideration. The treatment of this case is not difficult, nevertheless it does possess several unusual educational features. First to classify it requires keen observation and a thorough training in that basic principle of modern

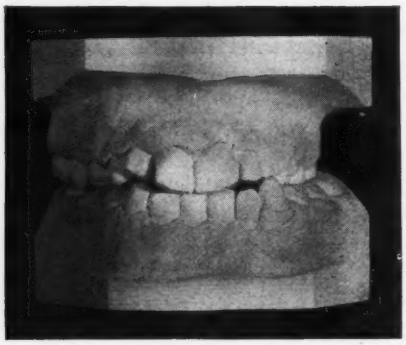


Fig. 13-A.

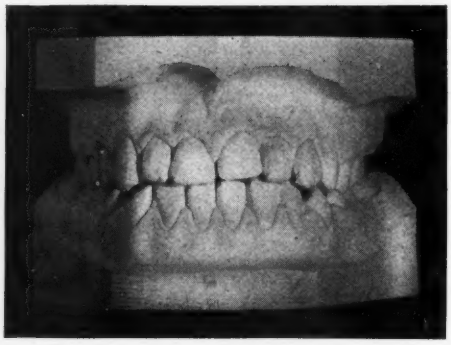


Fig. 13-B.

Fig. 14.

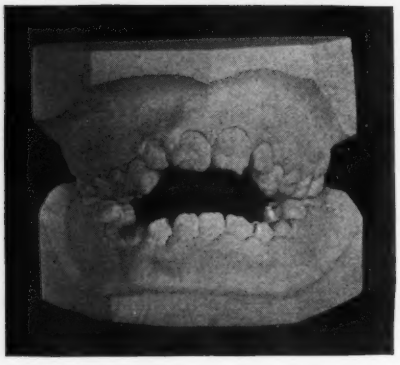


Fig. 15-A.

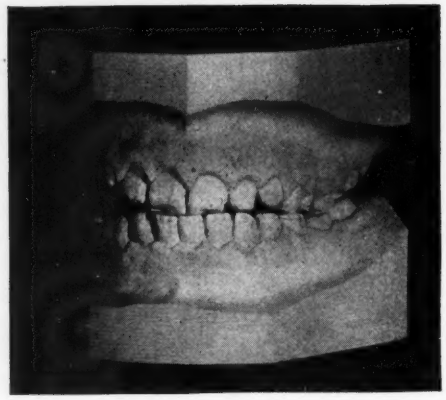


Fig. 15-B.

orthodontia, the Angle Classification. A poorly taught student might easily classify it as belonging to Class III, but one well grounded in this fundamental will carefully observe the molar relations and group it as a member of the first great class.

Another interesting feature is that no appliance was necessary to retain

the case after treatment. It was self-retaining—still another example of that cardinal principle, that the occlusal equilibrium is nature's retainer.

Case VI.—Fig. 13-A presents to the student a problem in anchorage. It will be observed that the left side of the superior arch is in lingual occlusion, and to make this side normal it will require skillful handling of every ounce of the available anchorage, for it is a case of pitting one lateral half of the arch against the other lateral half. Members of this society well know the procedure of employing "mass anchorage" and all the technic which goes with it.

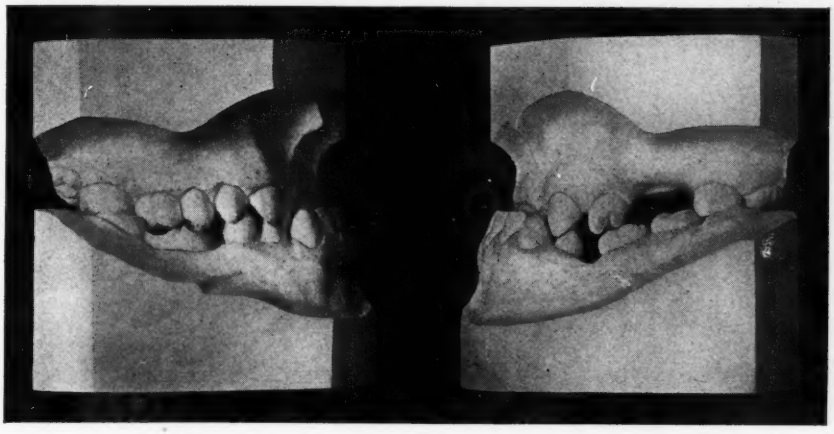


Fig. 16.

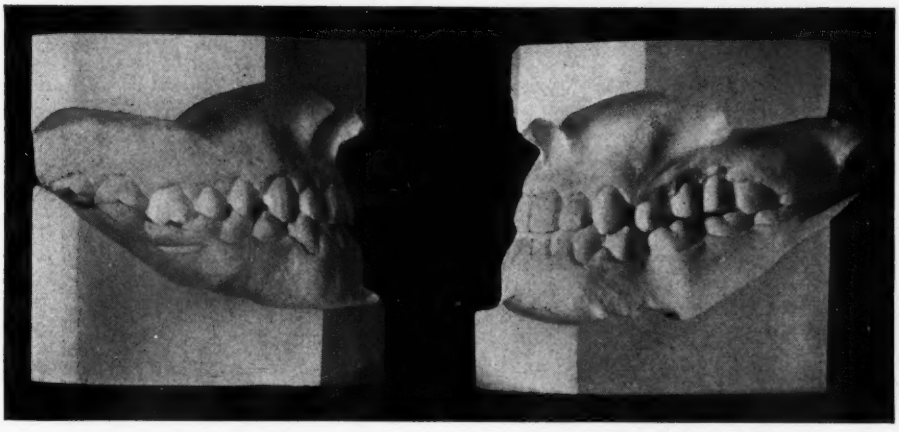


Fig. 17.

Fig. 13-B shows the skillful work of the student, for the result has been accomplished without upsetting the anchorage. Fig. 14 shows the palatal aspect of the superior arch before and after treatment.

Case VII.—Fig 15-A shows a condition brought about by a pernicious tongue habit, and we see in Fig. 15-B the results of the student's perseverance in combating this deeply rooted habit.

Case VIII.—This case (Fig. 16 and Fig. 17) might be fittingly termed a "Harvard product," for the orthodontic work is a product of the Orthodontic Department of the Harvard Dental School, the skillfully constructed crowns

and bridges, the product of the Prosthetic Department, the beautiful gold inlays the product of the Operative Department, while the patient himself was a student in the Harvard Academic Department, and he is now a loyal supporter of the Harvard Dental School.

Fig. 18-A is a photograph of a typical sufferer of Class II, division 1. Note

Fig. 18-A.

Fig. 18-B.

Fig. 19-A.

Fig. 19-B.

the vacant stare. In Fig. 18-B observe the transformation—a bright, intelligent face. The keen-eyed student noted this change and asked the cause. My fellow practitioners well know the underlying cause—it is normal occlusion. The misplaced lower jaw has been brought forward to its normal position, there is full power of mastication, there is normal tongue room, there is normal respiration and there are normal facial lines. All this, combined, has given the boy his manly carriage and set up.

The next two photographs (Figs. 19-A and 19-B) illustrate in profile another case similar to the preceding, and again the same transformation is seen.

No thoughtful person can study these last four photographs without realizing that the correction of these deformities has changed the future of these dental cripples, for these deformities go deeper than mere facial disfigurements, they penetrate even the highest nerve centers and it is evident that their correction has had a direct and powerful influence in both the visible as well as the invisible—in other words—the treatment has brought about a far-reaching psychological change.[3]

I feel that it is not necessary to burden you with further illustrations of the clinical work of the students. But in conclusion it must be added that whatever success practical orthodontia in our school has attained and whatever value the clinic may possess as a charity is due primarily to a principle laid down by that great educator, President Emeritus Eliot, and this principle is the principle of individual instruction.

President Eliot pointed this out clearly in an address to our teaching staff and student body some years ago. Speaking of the mode of instruction in the Harvard Medical and Dental Schools, he called particular attention to the fact that the proportion between teacher and student was such that there was one instructor to every two students. Continuing he said, "This proportion without exaggeration is unprecedented. No such relation exists elsewhere in the university or in any other university. And the object of all this is to give individual instruction and to have this individual instruction presented to the students by skillful experts."

INHERITANCE OF MALOCCLUSION FROM A BIOLOGICAL STANDPOINT*

By T. G. Duckworth, D.D.S., San Antonio, Texas.

IN the January, 1916, issue of the *Dental Cosmos* appeared an article by Dr. C. H. F. L. Nord, of Gornichem, Holland, on the importance of biology as applied to dentistry. No doubt some will agree and others disagree with the views he has taken, and especially in reference to heredity and extraction. Nevertheless, he has, according to my way of thinking, stated some very true biological facts, as well as truths that are not biological.

Though I am fully convinced that the science of biology is of value in the understanding of the etiology of malocclusion, I am as yet unable to say positively that malrelation of the teeth and maxillary bones are ever inherited or even carry a hereditary tendency.

Drs. Angle, Case, Cryer, Jackson, Dewey, Goddard, Hellman and probably others have made statements which are conflicting. No doubt those men have

[3]The psychological effect produced by the treatment of Class II, division 1, was alluded to by me in "A Consideration of the Occlusal Balance," read before the New York Institute of Stomatology, Nov. 4, 1904, and published in the International Dental Journal, December, 1905, Vol. xxvi, No. 12, pp. 788-9.

*Read before the Sixth Annual Meeting of the Alumni Society of the Dewey School of Orthodontia, Kansas City, Mo., February, 1916.

reasons for their statements, for they are the result of many years of study and observation.

The burden of proof from any of these statements is so lacking and the expansion of literature is becoming so great that we often find answers coming back from where we started. As yet we must draw our own conclusions as the result of study and observation, as to whether malrelation of the teeth and maxillary bones is hereditary, congenital or acquired. Wallace, Galton, Darwin, Weismann and others have all had something to say in reference to heredity, but do they point out directly or indirectly that malocclusion of the teeth is inherited or that it is not inherited? If time would permit, it would be a beautiful thing to go into some of the biological facts which would lead up to a proper conception of the laws of heredity, but the expansion of literature is so great upon the subject that I will have to treat it simply on the surface.

The Writer's Views.

In my opinion from the study of anatomy, embryology, histology and biology there is no disease, or malformation, that is directly transmitted from parents to offspring as the result of being impressed upon the chromatin of the germ cell. No doubt there are many instances in which disease has lowered the vitality of the chromatin of the male and female pronucleus to such extent that they are incapable of fulfilling their normal function, and if continued through generations would progress toward degeneracy; however, this would not interfere with the normal impressions of transmission upon the chromatin of the germ cell, except to lower its activity in producing a healthy individual, which is necessary in bringing out the characteristic race attributes.

So long as an individual develops along the lines of perfection and in harmony with the type intended which is governed by environment, it is to that extent hereditary. Any deviation from this course can be attributed to congenital or acquired causes. Apparently in the same sense that the centrosome presides over cell division and the chromosomes over the species, the virulency of the chromosomes presides over the sex. For instance, the virulency of the chromatin of the male germinal cell predominates over the chromatin of the female germinal cell which will be productive of the male sex carrying with it the characteristics of the father, while on the other hand the virulency may predominate in the female germinal cell carrying with it like characteristics. Where the virulency of the chromatin in both sexes is near the same degree we have the offspring resembling both parents, latent characteristics no doubt predominate at intervals in which the offspring will resemble some of its ancestors.

The teeth are intended and are used for a useful purpose and when we find deterioration of tooth structure as is exemplified in the human race and which has caused so much suffering and which is repaired only by artificial means, it is reasonable to believe there must be some degenerating elements working upon the race as a whole, which is not exemplified to the same extent in lower animals.

The degenerating elements working upon the teeth of the human race can well be defined in most every individual, which cannot be said in reference to

any of the lower animals; in fact, there are no deteriorating elements working upon the teeth of the lower animals that can be said to exist to any degree over one class than over another,—however the degree in the human race is much greater, and very probably the difference lies in the mode of living which is so radically different from that of the lower animals.

One of the known causes of malocclusion, is lack of proper use of the tissues that go to make up the dental apparatus. This is well exemplified in other tissues of the body that were intended for useful purposes which have not developed as the result of lack of sufficient and proper use,—however, these tissues were intended in the makeup of the individual, therefore, were impressed upon the chromatin of the germ cell. On account of the mode of living these tissues are not put to serviceable use (which accounts for their lack of development) and are oftentimes removed by surgical means, as their presence is often objectionable, rather than doing good in the present way of living.

Take the present known or supposed causes of irregularities of the teeth and maxillary bones, make a thorough study of each,—the results will be congenital or acquired. Very likely inherited and congenital conditions have been viewed from the same standpoint, taken for granted that all congenital conditions are inherited, which would lead to conflicting ideas and statements. Clinical observation based upon a study of normal development of plant and animal life will often be sufficient proof to justify a positive statement, but to demonstrate it becomes quite a problem.

Family Traits.

"Family traits" is a familiar way in which certain types of malocclusion were referred to by certain writers who based their theory principally upon the fact that in the sons and daughters irregular teeth were the result of irregular condition of the teeth of the parents, direct transmission from parents to offspring,—this refers especially to Class III and Class II, Division 1 cases.

Intermarriages of Races or Mixing of Types.

"Intermarriages of races" or "mixing of types" has often been referred to as producing certain malformations of the jaws and associated tissues as the result of parents being of different physical size, producing an offspring in which the child would inherit the small jaws from one parent and the large teeth from the other. These views are in direct contrast to the laws of nature. It was not intended that the gateway to the alimentary canal be so distorted as to hamper the individual in building in the most favorable manner a strong and healthy body. On the other hand, after the impression of heredity has been made, the individual must live in a state of perfection and in keeping with the impressions made by heredity. The mode of living in a state of perfection has probably never been realized, but it is possible, and until it is attained we must revert back to congenital and acquired conditions.

On examining the mouths of several hundred school children, it was noted that tissue deterioration and malocclusion were most prevalent in children of a very young age. So long as the teeth are allowed to decay and the gums are

continually diseased, and the nasal passages are obstructed, malocclusions are going to exist. Pyorrhea specialists tell me that a great many cases of diseased gums are found in well kept mouths, showing that sanitary precaution in itself is not a preventive to infection and must be eradicated by raising the resistance of the tissues by a gradual change in the mode of living.

Differentiations have been made between living and nonliving substances, all of which are capable of being resolved into one or more of the simple elements of which they are composed. Living substances, complex as they may be, fulfill their mission in a variety of ways, some answering as food for other living substances, which also may be poisons for still others, and so on through the chain of living organisms. Anything capable of assimilation, growth, reproduction and locomotion is said to be of the living variety and is endowed with the power of transmitting through generations its original identity.

The nonliving substances are incapable of assimilating, therefore cannot reproduce, grow, nor can they change locations by their efforts. It is only in their most elementary forms that their identity is retained. It is through heredity that animal and vegetable identity is retained.

Dental Authorities.

I will mention some of the views of dental authorities for and against hereditary malocclusions.

Dr. E. H. Angle.—"Every individual shows a certain harmony and beauty; the short built and round-headed shows a more rounded dental arch with short and broad incisors. In a case with a tall individual with long, narrow face, we find the long and narrow arch with the incisors much more inclined. Nature does not make the mistake of having a child inherit a short leg from the mother and a long leg from the father, or a narrow arch from the mother and broad teeth from the father; on the contrary, the child either resembles the father or mother, or both, or does not look like either one of them, thus differing from each, but possessing teeth and jaws and legs and face and other extremities in harmony with the entire type, just like everything is in harmony in the case of the parents."

Dr. C. S. Case (*"Extraction in Orthodontia."*).—"For nature knows no law of esthetics, no matter how beautiful and harmonious her productions may be. Every wrong position which we may find in dental and dento-facial relations points immediately to the law of heredity as a cause of many malocclusions of teeth."

Dr. M. H. Cryer.—"I fear that those who assert that all causes of irregularities of the teeth are postnatal have not read, and still less studied, the laws of cross-breeding and of heredity. The researches and writings of Mendel, Darwin, Weismann, De Vries, Burbank and others tell us that all variations are determined by the laws of heredity, except those arising from accidents."

Dr. Martin Dewey.—"From an embryological standpoint it is impossible that a child inherit the lower jaw from one parent and the upper jaw from the other."

Dr. V. H. Jackson. (*"Orthodontia."*).—"One of the most prevailing causes

of irregularities of the teeth is the marriage of individuals with different characteristic race attributes. Very often we see the case of a child inheriting the small jaw of one parent and the large teeth of the other."

Dr. C. L. Goddard. (*"Text Book of Operative Dentistry."*).—"Large teeth may be inherited from one parent and small jaws from the other, and thus produce an irregularity of some kind."

Dr. Milo Hellman.—(*Dental Cosmos,* September, 1914, *"A Study of Some Etiological Factors of Malocclusion."*).—"The influence of heredity, although acknowledged by many authors in relation to orthodontia, and again refuted by others has up to the present time not been considered with any sufficient degree of accuracy, and as yet remains an enigma so far as it relates to the problems of malocclusion of the teeth."

Attention has been called by Dr. Nord in an article read before the Society of Holland Dentists to a few citations taken from an article by Carl Röse which was published in the *Dental Cosmos* of November, 1912. The citations are as follows:

CITATION FROM CARL RÖSE'S ARTICLE.

"It is undoubtedly true that we modern dentists, in the same way as the medical men, benefit the living individual, but check the sound development of the race, unless we combine all our energy to become also the guides of civilized humanity in the field of the hygiene of nutrition.

"Unless we learn from history, and with all our energy resist the increasing degeneration of the race, it will not take even four hundred years, perhaps, until in Stockholm a Tartar chief, in Berlin and in Paris, Asiatic vice-kings reside, while perhaps in Washington a negro or mulatto is enthroned as President.

"Relentless war against the increasing hyper-refinement of life, return to a simple and natural mode of living,—that must be our dental slogan,—lest we knowingly cooperate in the destruction of modern civilized humanity.

"Disregarding a few occupational diseases, such as confectioners' caries, tooth decay is not a disease in itself, but as cannot be too strongly emphasized, simply a specially plainly visible symptom of general physical degeneration,—the gauge as it were, to human health.

"For that reason we must think and act medico-biologically. Many a young girl with poor teeth would not, despite abundant financial means, be sought in matrimony, owing to her homely appearance, and would not propagate the predisposition to bad teeth, had we dentists not embellished her teeth. The most degenerate individuals with poor teeth must be prevented from marrying healthy mates with good teeth by most considerate, but none the less most firm, unyielding measures.

"It cannot be repeated often enough that bad teeth especially are, as a rule, simply a partial symptom of general physical degeneration. The most radical remedy would be, of course, to forbid such degenerates with specially poor teeth to marry, as is done with all other pronounced degenerates. Nothing is left but to appoint physicians and dentists as officials, as publicly employed

health inspectors. But even they would be unable to prevent the increasing degeneration and the ultimate doom of the white race, unless the public powers gave them authority to practice rational race hygiene, to prevent the propagation of the most seriously degenerate subjects by interdicting their marriage, and to inhibit the further progress of degeneration by the introduction of a rational hygiene of nutrition."

What Dr. Nord Has to Say.

Nord has the following to say in reference to Röse's Article:

"In Röse's article, again, emphasis is laid upon biology as a nucleus for his theory, but again no proofs are given for his statements, which consequently could not find ready acceptance.

"Suppose such an official as Röse recommends were appointed, and that he were to receive full executive power, then Röse would see no objection to applying extremely severe measures, without even being able to give proof of his theories upon which these measures are based.

"Inasmuch as the majority of our modern biologists disagree with Röse it would certainly be out of the question to propagate such measures when the theories on which they depend are considered generally as not only incorrect, but are rejected by the majority.

"It is peculiar how these subjects, and this applies to the entire question of heredity in dentistry, are treated, and positive views are expressed, without any endeavor being put forth to indicate on what proofs these views are based.

"In conclusion, and while the theory of selection, variability of the species, direct and latent heredity and environmental influences have not been taken up and discussed in a systematic order, it is convincing that variability exists in every living being according to hereditary tendency; the useful varieties are favored by natural selection. Latent transmission no doubt is an important part of heredity, while environmental factors are of no influence upon the heredity germs."

A CASE OF NEUTROCLUSION, COMPLICATED BY EXTREME DISTOVERSION OF THE UPPER CENTRAL INCISORS, AND REDUNDANCY OF NUMBER

By Urling C. Ruckstuhl, D.D.S., St. Louis, Mo.

THE history of this case is characterized by neglect on the part of the parents and child. The patient was a boy of thirteen years, unusually large and well developed for his age. At the time he presented himself for treatment both lower first permanent molars were decayed to the gum margin, and there were large perforations through the pulp chambers, making extraction necessary. Upon inquiry I learned he had never made a practice of brushing his teeth. Between the upper central incisors were two cone-shaped supernumerary teeth which had caused the central incisors to erupt distally, and the lateral incisors had erupted

lingually to the centrals. Both of the upper deciduous cuspids were in place, and the permanent cuspids were erupting labially to them.

After thoroughly cleaning his teeth, plaster impressions were taken, and the decayed molars, deciduous cuspids, and the supernumerary teeth extracted.

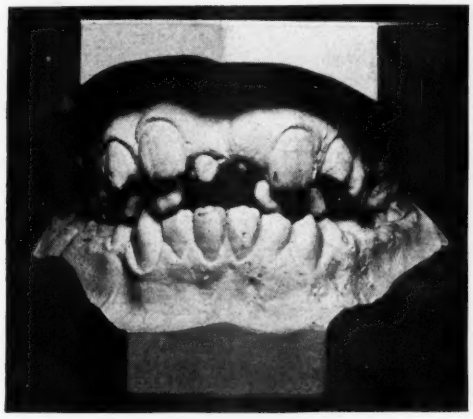


Fig. 1.

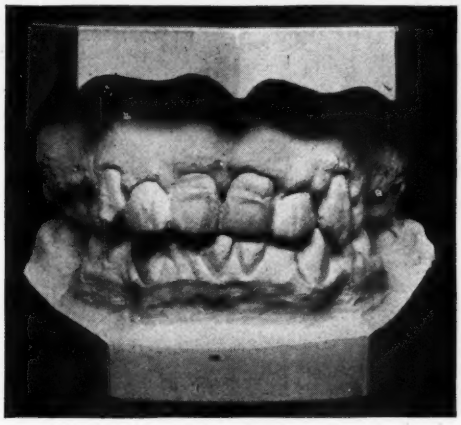


Fig. 3.

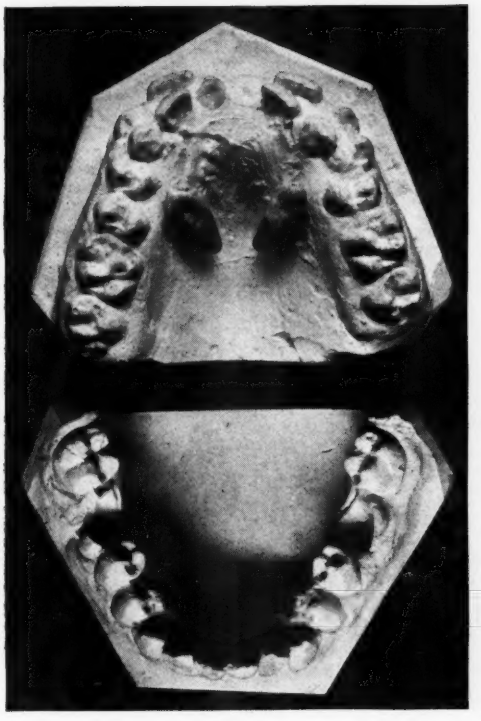


Fig. 2.

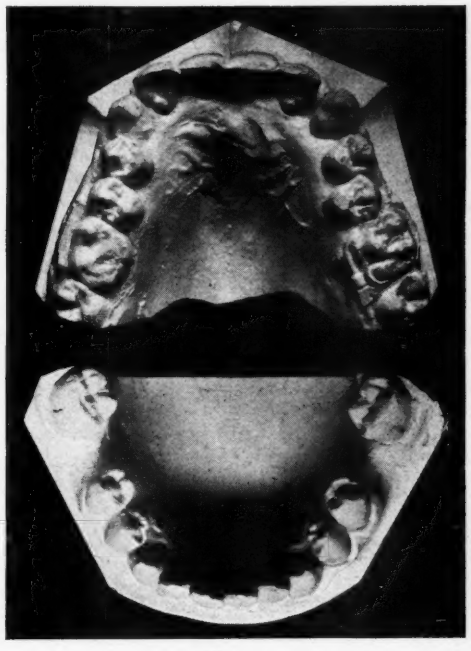


Fig. 4.

After the models were finished, the extracted supernumerary teeth were pasted on the lingual surface of the upper model to preserve them, and they can be very plainly seen in Fig. 2.

Plain bands were constructed on the upper central incisors, and tubes soldered to the labial surfaces to permit the use of a horizontal threaded bar with a nut at each end. (See Fig. 5.) Patient was seen twice a week, and the nut

at each end tightened. As the teeth moved, the ends of the threaded bar were cut off. By applying the tension to these central incisors shortly after the supernumerary teeth were extracted, the bodily movement was much easier than if it had been necessary to move them through solid, healthy alveolar tissue. After a period of about thirty days the central incisors had moved bodily until

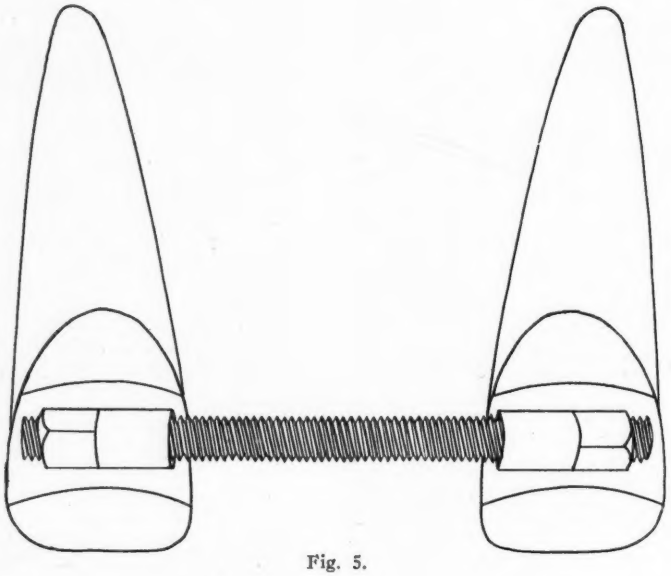


Fig. 5.

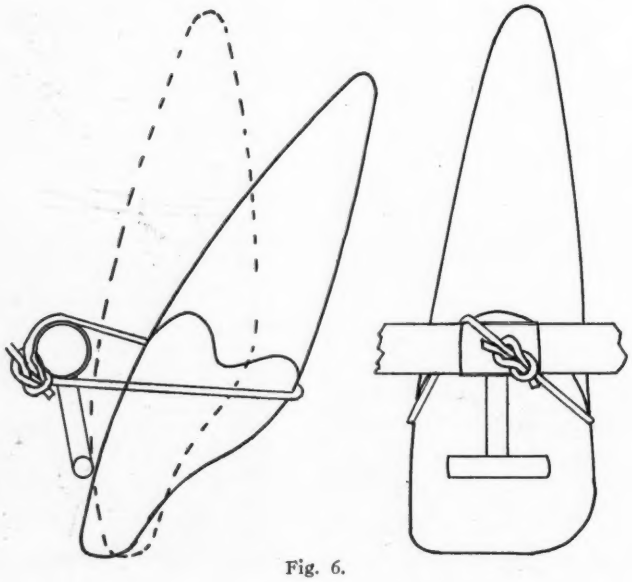


Fig. 6.

they were in contact. At this time molar bands were cemented to the upper first molars, and a plain alignment wire and silk-grass ligatures used to bring the laterals labially, and permit normal eruption of the cuspids. The labial movement of the laterals was considerable, and both of them tilted badly. An appliance was constructed, as shown in Fig. 6, which brought the roots out into position nicely, and by twisting the T-shaped end, any necessary rotation was easily accomplished.

The post-treatment appliance consisted of plain bands on the central incisors, with a lingual wire extending distally to hold the laterals in place.

This case, while somewhat unusual, should not be a difficult one to treat under normal conditions, but upon examining Figs. 3 and 4, it will be noticed that it is not what might be called a perfect result. After the first month of treatment the patient began to break appointments. It was a frequent occurrence for him to remain away several weeks between treatments, and when he did return, his mouth would show the evidences of neglect. Ligatures would be off, and particles of food wedged around the tubes on the molar bands. Once there was an interval of two months before I could get him back to the office for treatment. During this interval a ligature had slipped up under the gum around the left upper lateral, which resulted in death of the pulp of that tooth. I could never induce him to return to his dentist for treatment, with the result that the last time I saw him this tooth was slowly turning black. I finally dismissed him with the result shown in Figs. 3 and 4. While it is not a perfect result, he is not quite as badly off as he was before treatment.

GAINING AND KEEPING THE CHILD'S CONFIDENCE DURING ORTHODONTIC TREATMENT*

By Raymond L. Webster, D.M.D., Providence, R. I.

IN our keen pursuit of knowledge whereby we may more accurately master the daily problems which confront us in our practice, we are quite apt to slight one which is very important, especially to us as orthodontists, namely, gaining and keeping the child's confidence. Just as we study the causes and treatment of each case of malocclusion which we are called upon to treat, so should we make a most careful study of the temperament of each child, thereby obtaining a perfect mastery over him and making the ofttimes prolonged work one of harmony both to the patient and to ourselves. Suffice to say that we very often need the magnetism of Moses, the patience of Job, and the wisdom of Solomon, but how can we develop these faculties? In the first place we must have the right attitude toward the little patient during our work with him and realize that even a little child is a person having rights, needs, and wants. In many instances, if we could for the time forget them as children and treat them as grown people, we would get along much better with them. The normal child is ready to observe and notice and reason and draw his own conclusions from everything he sees and hears, and while he may as yet be very ignorant and extremely credulous, just for these very reasons, if for no others, he puts us on our honor to be truthful and honest in all our dealings with him. So, at our first regular sitting, before we fill the patient's mouth with plaster, a moment spent in explaining just what this process is, showing him an impression previously taken and the pieces put together like a picture puz-

*Read before the Sixth Annual Meeting of the Alumni Society of the Dewey School of Orthodontia, Kansas City, Mo., February, 1916.

zle, arouses his interest and relieves any nervousness. Then, while the plaster is hardening in the mouth, and, if necessary, you are giving a quiet assurance that it will not choke him even if it feels that way (of course, using the mechanical precautions to back it up), a word spoken to him about noting that the plaster contracts and gets warm, awakens him to the fact that he is feeling these very sensations, that you know what you are talking about, and then he immediately starts to put his confidence in you. The assurance of seeing some nice white models of his own teeth at the next sitting sends him away with a keen interest to be on hand at that time.

At the treatments that follow, if the patient shows an interest in what is being done to his appliance, this interest can be kept by letting him watch you while soldering, etc. For those not interested, usually girls, a magazine with attractive pictures put into their hands with the understanding that it is to be put down when you return to the chair, passes the time without the development of uneasiness, and keeps the child's mind off of the clock.

Some men have or develop a faculty for telling stories to their younger patients. Sully cited a case of a boy who was listening with apparent impression to his mother's serious talk one day, but closed the colloquy with the observation: "Mamma, when you talk you don't move your upper jaw." Although this might be the result of some of our story-telling, yet if we held our hearer's attention as well as this mother did, we might consider our purpose achieved. Our work needs so much serious thought while the patient is in the chair that we usually have to omit any long narrations.

As the weeks go on and the patients get familiar with the surroundings, we may become companionable with them, but we must not let them take advantage of this attitude. We must preserve a certain amount of firmness and dignity if we wish to keep their respect. George Walter Fiske writes, "Never create a condition among those whom you try to help which you cannot make a permanent one," and I think this could apply to us.

With our smallest patients, they may unconsciously do some harm to our appliances, and we must not be cross to them, but explain to them, for oftimes they do not know why what they did was wrong. With the older patients, the responsibility of the appliance can be put to a certain extent on their shoulders.

If a patient shows signs of discouragement in regard to the length of time that the appliance has been on, etc., we might give him a word of encouragement in something the same manner that a father did to his son. For years he had been scolding him for stooping, with no result, but one day he tried a new plan, and said, "Tom, what a magnificent chest you have."

Occasionally we have to deal with a child who has never had to mind at home and then our task is a little more difficult. When Johnson says that no class of men, even medical practitioners, are placed in so favorable relationship to these patients for the purpose of instilling into them obedience and stability of character as is the dentist, he shows us one of the greatest opportunities to do our part in developing true manhood and womanhood in coming generations. Government by word should be by means of fewest words possible, but these timely, decisive, cheerful, and not domineering, challenging

to obstinacy, or irritating to wrath. Sarcasm is a kind of word-discipline which should be pretty nearly abolished, for with it we are sure to lose the respect of the patient, and we must remember that personal loyalty makes willing obedience.

In closing, I wish to say that I have been prompted to choose this subject for my paper by remarks heard at different times. Many people have unpleasant recollections of the time spent during orthodontic treatment in past years, and while I realize that the science has so advanced since then that pain sometimes led them to make these statements, I believe that in many instances the practitioner had never mastered the proper management of his patients. Let us try to make our work more pleasing to our patients, and we shall surely find that the sense of satisfaction in the good attained is well worth all of the effort it requires to accomplish it.

American Illustrated Medical Dictionary (Dorland)

A new and complete dictionary of terms used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Veterinary Science, Nursing Biology, and kindred branches; with new and elaborate tables. Eighth Revised Edition, Edited by W. A. Newman Dorland, M.D. Large octavo of 1,135 pages, with 331 illustrations, 119 of which are in colors. Published by the W. B. Saunders Company, Philadelphia and London. Flexible leather, $4.50, net.

Dorland's Medical Dictionary has long been accepted by the medical and dental professions as the standard book in its line. A great number of additions have been made to the different tables and the use of colored illustrations increases its value many fold. The work is quite complete so far as dental terms are concerned, although some of the more common orthodontic terms have been overlooked. The dictionary contains the words "orthodontia" and "dental-orthopedia," but does not contain the word "orthodontic" either as an adjective or "orthodontics" as a noun. The definition of the word "occlusion" is not given from a purely orthodontic standpoint, as we understand the word. Such words as "mesioclusion" and "distoclusion" fail to appear in the dictionary. These things simply emphasize the fact that a dictionary of dental terms should be edited by a dental man. As a dictionary of the medical sciences, we know of nothing equal to it, and we are sure the eighth edition will continue to occupy the high pinnacle in the medical profession that the former editions have enjoyed.

American Society of Orthodontists

The American Society of Orthodontists will hold their annual meeting in Pittsburgh, July 20, 21, 22, 1916. The usual high standard of the meetings of this society will be maintained. All those interested in Orthodontia are welcome. Any communications regarding the meeting may be addressed to Dr. F. M. Casto, 520 Rose Bldg., Cleveland, Ohio.

CURRENT ORTHODONTIC LITERATURE

EDITED BY H. C. POLLOCK, D.D.S.

Methods of Teaching Orthodontia to Dental Students

ORTHODONTIA as a distinct branch of dental study has had a place in the curriculum of dental schools of the United States for many years according to S. H. Guilford, A.M., D.D.S., Ph.D. (*Dental Cosmos,* March 1916). He says that at first it received only a limited amount of attention in its limited stage of development, but has gradually attracted more and more attention from both teacher and student.

In some schools orthodontia is taught by a special instructor dissociated from any of the more commonly taught branches, but in any event it has been found that the essential didactic teaching can be covered in about ten lectures of one hour each.

The practical instruction carried on in the college infirmary upon charity patients is usually extended over one or two entire college terms.

Plan of Didactic Instruction.—In the division of the subject so that it may be covered in the course of ten hours of didactic instruction, the following apportionment may serve as a guide:

(1) Definition of normal human dentition, including position and relation of the several teeth in each arch. This once understood, any deviation from it plainly constitutes an irregularity or malposition. The etiology of the condition, as far as we understand it, should also be included.

(2) Facial harmony and occlusal relation. It should be shown that orthodontia includes more than the readjustment or position of the crowns of the teeth so as to bring them into useful and harmonious relation, and that the position of the roots and adjoining alveolar tissue have to be considered, in order that the middle third of the face may be restored to its natural fullness and placed in harmony with the other features. Normal occlusal relation of the teeth in one arch with their opponents needs to be fully elucidated and pressed home, for any deviation from such normality constitutes a malocclusion of greater or lesser extent.

(3) Physiology of tooth movement. Changing the position of the teeth or the forms of arches necessarily involves changes in the soft and hard tissues affected by the movement. The character of such tissues and the changes they undergo, together with the understanding of the narrow dividing line between physiological and pathological change, needs to be emphasized.

(4) Dynamics. The various mechanical forces that may be employed in the movement of the teeth, their relative value, manner of employment, and proper regulation.

Materials and their use in the construction of appliances, together with the technic employed in such construction, should be given full consideration.

(5) Examination of patient and preliminary study of case. Taking impressions; model-making for further study and for record.

(6) Classification. Unfortunately, the different forms of malposition or malocclusion have never been classified in a way to be acceptable to all teachers or practitioners. There are as many different classifications as there are authors of text books on the subject, each having his own. Every teacher should therefore select the one which impresses him most favorably and employ it in instructing his classes.

(7) An exposition with enlarged and natural sized models, and appliances of the manner of treatment of each class of malposition.,

(8) Continued.

(9) Continued.

(10) Principles governing retention. Various forms and kinds of retainers, methods of construction, and the principles governing their operation.

Illustrative Sample Appliances and Models.—During the seventh, eighth, and ninth lectures the teacher should have upon his lecture stand a gigantic model of the upper arch and palate, about fifteen inches in diameter, with teeth of the manner of treatment of each class of malposition.
of suitable size placed in their sockets surrounded by modeling clay, so that their positions may be varied to illustrate the typical forms of malposition.

Enlarged regulating appliances are then placed in position and operated in a manner to bring the malposed teeth into normal alignment. By this means the teacher is enabled to reach the student's intellect through the medium of the eye more forcibly and directly than by verbal descriptions alone or by charts. The latter have their value, but experience has shown that the methods of applying force, and the actual movement of teeth in the enlarged model as seen by the entire class, convey a better idea to the student's mind than anything that could be shown upon the chart or blackboard.

Life-sized models of plaster of Paris, celluloid, or vegetable ivory, with natural size appliances upon them showing methods of correction, also serve a valuable purpose. These can be passed to the class for hasty examination during the lecture, or held for a more minute inspection at the close of the lecture hour.

While these illustrated lectures are delivered during both the junior and senior years, the manual or technic instruction in the construction and adjustment of appliances to a model of natural size should be begun about the middle of the junior year, or as soon as the professor has delivered his fourth lecture.

Technic Work.—The technic work should be in charge of a special instructor in a room properly equipped for the purpose, and all of the work of each student performed under his immediate instruction and supervision.

This course might well include drawing of wire in a drawplate; drawing strip of plate into tubing; forming metal bands to fit the different teeth, and various attachments soldered to the bands for convenience in applying force; threading wire and drilling and tapping nut to fit it; making wrench to fit nuts; making jackscrew and sleeve; joining wire by soldering; joining tubing at different angles; making piano-wire clips to hold parts during soldering.

After this course of practice in manipulative procedure, each student should be given instruction and practice in impression taking and model making.

Plaster impressions can be taken by students of one another's mouths, and from these models may be made and trimmed in an artistic manner. This practice will serve to familiarize them with the details of procedure, and lead to proficiency when the same operation is to be performed upon actual patients. Care and exactness must be exercised in every detail and each step inspected before the work is accepted.

Three hours a day for three days in the week for half a year should afford ample time to cover the course as outlined.

Clinical Experience.—During the senior or final year the student should be given clinical experience in orthodontia. All varieties of dental malposition and accompanying arch and facial deformity are to be found in the college infirmary during each college term.

All of these should be under the immediate direction of the instructor who has had charge of the technic course. The simpler cases may be assigned to students of lesser proficiency, and the more difficult ones to those who have shown special aptitude during their technic training.

Each case should be carefully examined by the instructor in the presence of several students, its clinical features pointed out, and the several ways in which correction might be accomplished discussed.

At such times it is well for the instructor to question the students about him as to their views in reference to the most advisable method of procedure. When their views indicate an intelligent perception of the salient features of the case, and a good understanding of the proper methods to pursue in correction, he should commend them, and when incorrect or faulty he should indicate wherein they have erred, either in diagnosis or proposed treatment.

When, after a full discussion of the case, a method of procedure has been decided upon, the instructor should assign the patient to one or two of the students, with instructions to begin the treatment. To aid them in their work it is well for the instructor to sketch upon a printed diagram—such as is found in all infirmaries for recording proposed work—the forms and kinds of appliances to be employed in the case.

The student or students who receive the case should then proceed to prepare the mouth for impression taking by a thorough prophylactic treatment, removing all calcic or soft deposits from the teeth and rendering them absolutely clean. At the same sitting, plaster impressions of both arches are taken, from which models are to be made. It will be found advisable to obtain two sets of impressions and models, one set to be used for the adapting and fitting of the parts of appliances as they are constructed, the other set to be retained for reference as the case progresses.

The time intervening before the following appointment is employed in the construction of the indicated appliances. Where the case has been assigned to two students conjointly, this work can be divided between them.

When the patient returns for the placing of the appliances, the instructor must be at hand to watch and direct every movement, but the actual work of

adjustment should be done by the students in order that they may thus gain the necessary skill and experience.

In some schools the instructor performs all the work of fitting and adjusting the appliances, while the students stand by and see it done, but in most schools it is considered more beneficial to the student if he is obliged to perform the work himself, even though it be at some sacrifice of the patient's comfort.

Similarly, at each succeeding sitting of the patient, the instructor should advise, and when necessary assist the student in his work, but as much of the responsibility as possible should be placed upon the student himself, so that he may gain the self-confidence which is one of the chief essentials of success.

Carried along in this manner, after the student has completed a few cases of malposition he will have gained as much practical knowledge of correction as can be gained in a college course, and be reasonably well equipped to conduct similar cases in private practice.

Dr. Edward H. Angle's Pin and Tube Appliance

IN discussing this appliance, Doctor A. H. Ketcham, Denver, Colo., (*Items of Interest,* March, 1916) considers the advantages and disadvantages, and shows many models and photographs.

Among the advantages, attention is called to the fact that results obtained are more nearly ideal in occlusion, with more nearly correct angles of inclination of the teeth.

There is better stimulation of development of bone surrounding tooth roots; better stimulation of development of the nose cavity, and less pain for the patient.

Then, too, visits of the patient are less frequent. Patients from a distance may be treated as readily and with as good results as those nearby.

Prophylactic advantages are of moment.

The operator develops greater technical skill, forming the habit of careful, scientific observation through weighing the effect of pressure exerted by this delicate appliance.

Among the disadvantages is the necessity for the operator who would use this appliance to the greatest advantage, to have special instruction from Dr. Angle or some skillful teacher who has had the benefit of Dr. Angle's instruction.

The technic of constructing this appliance is difficult, requiring the best efforts of even the most skillful operator. The eye and nerve strain is severe. The former may be reduced by wearing some form of prisms or loupes, while the latter is lessened as skill is acquired.

The expense and time required to construct this appliance is a disadvantage to the operator who has not developed his salesmanship sufficiently to prove easily that the benefit obtained by using this appliance is great enough to warrant the maximum fee.

Attention is called to the difference in principle of application of force between the old and the new appliances.

With the old expansion arch force is transmitted to the teeth through ligatures which must be tied tight. As soon as a tooth moves the ligature slips, irritating the gum and allowing back and forward movement of the tooth, inducing inflammation and soreness. With the new appliance, the force is transmitted without loss through a pin soldered to the arch. The pin accurately fits, telescopes and locks in a tube soldered to a band which is cemented to the tooth. By this means very gentle pressure may be employed, as all the force is transmitted to the tooth.

Dr. Ketcham cautions against the use of inferior materials in an attempt to construct these appliances. Located in Denver, which, like Los Angeles, every person who can afford to travel will sooner or later visit, he sees much of the orthodontia practiced in this country. He has been astonished to find that some orthodontists will use crude makeshifts which are lacking in strength, spring, delicacy, and the high percentage of precious metals which are contained in the appliances as developed by Dr. Angle. These appliances are manufactured by a firm which has spent thousands of dollars in perfecting machinery to produce them with the greatest degree of accuracy and at the minimum cost, and whose metallurgist is spending much time to perfect the precious metal alloys used.

This accuracy in material used by the orthodontist helps in the accuracy of his work, and when he says he is using Angle's new appliances, but is only using imitations, he is deceiving his patients. It is impossible to secure as good a result and carry on the treatment with as little pain and discomfort to the patient. Besides, the operator with crude appliances deceives himself, because he is obliged to spend more time upon a case.

An Ode to an Orthodontist

By His Patient

To a bad orthodontist
I write this little poem,
To tell him what I think of him
In a made up nursery rhyme.

Oh! Doctor Weeks, most cruel,
How could you lie so much?
You said you would not pull my tooth
And other tales as such.

You were only going to fix my arch,
You would not touch my tooth
Oh, No! Oh, No! it was not so,
My tooth was out, forsooth!

I was so shocked, I could not think
Of anything to say,
Except that I was so surprised
That he should lie that way.

"You must have pulled that out yourself
Before you me did see;
Or was it Doctor Houson
That did that job for me?"

"Oh, no!" I said, "'Twas Doctor Weeks,
That did that job so cruel."
He then did have to set about
And gather some more fuel.

To set his thinking furnace
A-going, don't you see?
He thought a while, and then did make
A slight remark to me.

"I haven't anything to pull
A tooth with, so I'm 'fraid
You'll have to lay the blame on Doctor Houson
Or yourself, my little maid."

Moral

And after this when orthodontists
Fuss a good deal with one tooth,
I shall just shut my mouth up tightly
And say, "I'll keep this tooth."

—Elizabeth Whitney,
Saginaw, Mich.

The International Journal of Orthodontia

PUBLISHED THE FIFTEENTH OF EVERY MONTH BY

THE C. V. MOSBY CO., 801-807 Metropolitan Bldg., St. Louis, Mo.

Foreign Depots—*Great Britain*—Henry Kimpton, 263 High Holborn, London, W. C.; *Australasia*—Stirling & Co., 317 Collins Street, Modern Chambers, Melbourne; *India*—"Practical Medicine," Egerton Street, Delhi; *Porto Rico*—Pedro C. Timothee, Rafael Cordero 68, San Juan, P. R.

Subscription Rates—Single Copies, 30 cents. To anywhere in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, $3.00 per year in advance. Under foreign postage, $3.40. English price: 15/ per annum, 1/6 per number. Volume begins with January and ends with December of each year.

Remittances—Remittances for subscriptions should be made by check, draft, postoffice or express money order, or registered letter, payable to the publishers, The C. V. Mosby Company.

Contributions—The editor will be pleased to consider the publication of original communications of merit on orthodontic and allied subjects, which must be contributed solely to this journal.

Opinions—Neither the editor nor the publisher hold themselves responsible for the opinions of contributors, nor are they responsible for other than editorial statements.

Reprints—Since it is not desirable to hold type standing longer than absolutely necessary, all requests for reprints should be made at time of submitting manuscript for publication. Rate card will be sent with galley proof.

Communications—Contributed articles, illustrations, letters, books for review, and all other matter pertaining to the editorial department should be addressed to the Editor, Doctor Martin Dewey, 1016 East Armour Boulevard, Kansas City, Mo. All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 801-807 Metropolitan Building, St. Louis, Mo.

Illustrations—Such halftones and zinc etchings as in the judgment of the editor are necessary to illustrate articles will be furnished when photographs or drawings are supplied by the authors of said articles.

Advertisements—Objectionable advertisements will not be accepted for publication in this journal. Forms close first of month preceding date of issue. Advertising rates and sizes on application.

Change of Address—The publishers should be advised of change of subscriber's address about fifteen days before date of issue, with both new and old addresses given.

Nonreceipt of Copies—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply is apt to be exhausted.

Entered at the Post Office at St. Louis, Mo., as Second-Class Matter

EDITORIALS

The Attitude of the Dental Profession Toward Orthodontia

WE have had something to say several times in regard to the need of a more intimate relation between the practitioner of orthodontia as a specialty and the general dental practitioner. In times past many unkind things have been said by the dentist about the orthodontist, and likewise the orthodontist has made uncomplimentary remarks about members of the dental profession. That there exist more or less differences between the orthodontist and the dentist must be apparent to anyone who is acquainted with the condition. There are several reasons for these differences, and in some cases it is the fault of the dentist, while in other instances the orthodontist is to blame. The general practitioner often accuses the orthodontist of being narrow-minded, of refusing to give instruction in phases pertaining to orthodontia, and of declining to help the dentist treat the simpler cases of malocclusion. In some instances this is true. Those who have been practicing orthodontia for a considerable time will probably remember various occasions when papers have been read by

orthodontists before dental societies where empty seats predominated. In other words, the general dentist has not been sufficiently interested in orthodontia to pay much attention to papers on that subject. We have occasion to call attention to this matter at the present time because of two circumstances brought to our notice. The first is the arrangement of a joint program by several dental societies for a dental meeting to extend over a week, where, in looking over that program, we find that the subject of orthodontia is conspicuous by its absence. We have in this case a committee that arranged for a dental meeting which will probably be larger than any other meeting held this year, excepting that of the National Dental Association, and not a single clinic or paper on orthodontia during the entire week. The second circumstance is that the National Research Committee of the National Dental Association has investigated, or is investigating, practically every problem in the dental curriculum excepting problems pertaining to orthodontia. There probably have been more original investigations conducted by orthodontists in the past ten years than have been carried out by any other branch of dentistry. Of course the excuse for this is an old one—that the dental profession is not interested in orthodontia; but, if not, why not? It seems rather unfair that orthodontists in the United States should be called on to contribute to the funds of the National Research Dental Committee and then have their science ignored by this committee, and have the subject of orthodontia treated as if it were not entitled to any consideration.

The Question of Priority

OF the various problems with which orthodontists have to contend, there probably is no other one question which has caused so much discussion and on account of which so many friendships have been wrecked as the question of priority. It has been the aim of most scientific writers to be careful to give credit to whom credit is due, but it is sometimes difficult to determine who did a certain thing first. It is well known that at the present time the dental profession is divided on the matter of a process, in which case a certain person claims he developed the process first and obtained a patent for the method. He may have been entirely honest in his opinion as to being the originator, but it has been proven beyond a doubt that many persons followed the same process for years before he obtained his patent.

It occasionally happens that credit is given to an individual for an improvement, only to learn afterward that some other person has used that improvement in previous years. Orthodontic appliances have been greatly improved during the past ten years, and are much more efficient now than they were formerly, but there are nevertheless two certain mechanical principles present in all regulating appliances—the screw and the lever. The successful application of the modern appliance depends on the effective force to be derived from the screw or the lever. The use of the loop either alone or in conjunction with the screw is but a form of the lever or spring force.

We recently felt called on to consider the question of priority with special reference to the loop appliance, as *The International Journal of Ortho-*

dontia has published two articles concerning this appliance, with the result that we have received letters from various persons questioning our conclusions. It has been claimed that one article, at least, committed a grave breach of etiquette by not giving priority of the use of the loop appliance to different individuals. We therefore decided to examine the dental literature and ascertain if possible who was the first to use the loop as a means of increasing the efficiency, by improving the range of movement or the application of force, in their regulating appliance. We have written to several persons as to when and how they first used the loop, and, as is to be expected in a case of this kind, not one seems to have a very definite idea as to when he first made use of the appliance, but it is fairly well established that the loop was introduced by what is known as the Ainsworth regulating appliance as designed by Dr. Ainsworth, of Boston. The loop was used very early in modern orthodontia by Dr. Varney E. Barnes, of Cleveland, Ohio, in connection with the Barnes power tube. We find that a manufacturer of orthodontic appliances about ten years ago designed a pair of pliers for the formation of the loop, and manufactured appliances which were fitted on the model, embodying the principle of the loop. Of course, the loop, as used at the present time to supersede the screw, involves greater use than formerly. After careful consideration, however, of all the obtainable data concerning the use of the loop appliance, it is our opinion that none of the present claimants for priority of the principle involved are entitled to that distinction.

The Personality of the Dentist

THE personality of the dentist, particularly that of the dental specialist of today, is the pivot around which his general conduct to a greater or less degree revolves. By the term personality we must necessarily include more than pleasing manners, a gentle rearing, and kindly disposition. The dentist's personality should embrace several conspicuous characteristics which, taken as a whole, produce a character with strong inherent traits, added to which must be a refinement that is not acquired in a dental education as a part of the curriculum, but which can be developed by the ambitious dentist from a study of older and well-trained practitioners who have been broad enough to develop along more than one particular narrow path.

The mental and physical phases are of prime importance. A professional man should cultivate a well-balanced mind. He should be of strong mental caliber, unswerving in his deductions if he is assured of the ground on which he stands, and not be influenced by mere caprice or by persons whom nature has endowed with a dominating personality; nor should he, to use the vernacular, be "bluffed" by persons whom he knows not to be qualified to form an intelligent opinion on the subject at issue.

If at any time a professional man is judged by his personal appearance and action, it is when a new patient enters his office for the first time, for on such occasion he should present a certain degree of calmness and self-possession, which inspires confidence, the same as does a well-modulated voice. Composure, and yet a pleasant manner, possesses an asset that is invaluable to the

man who expects to be consulted by people who demand the best that science has to offer.

The professional man of today, if he is to advance, must be not only thoroughly qualified in his professional ability, but should also strive to be modern in his social accomplishments, and he should develop those qualities which are characteristic of a successful social and business career.

First University Dental School in New York for Columbia

REALIZING the importance of the teeth and mouth infections to systemic disease, the Faculty of the College of Physicians and Surgeons have unanimously voted in favor of the establishment of a dental department, to be connected with the medical school. A committee of prominent dentists of the city have presented plans to the Medical Faculty which have been approved.

The school of dentistry will be closely associated with the medical school and the admission requirements will be the same as the medical. The course will be four years, the first two years the same as those in medicine, thus giving the dental student a thorough knowledge of the fundamental sciences necessary to the practice of a specialty of medicine. At the end of the second year the dental student will give all his time to the study of dental subjects, namely, operative dentistry, prosthetic dentistry, oral surgery and oral pathology, orthodontia, etc., and the more technical part of the work required for the well trained dental surgeon. This new school will be the first university dental school in New York City and the second in the State. It will give the first four year course of dentistry ever given in the Empire State.

Research Institute of National Dental Association

The Research Institute of the National Dental Association was incorporated June 24, 1915. It occupies two large residences on Euclid Avenue, Cleveland. Its first report includes lists of directors, members, etc., and of problems begun or contemplated. Among these are systemic diseases resulting from oral infections, such as various joint diseases, iritis, nephritis, gastric and duodenal ulcer, glandular infections, pneumonia, pyorrhoea, dental caries, the brown stain of teeth, whose cause is entirely unknown, a platinum substitute (dentists using one-third of the world's production, valued at 2½ millions), filling of infected roots, oral bacteriology, salivary disorders, facial deformities, relation of ductless glands to dentistry, *orthodontia*, are included. Special research rooms will be available for visiting dentists. If this last item means that facilities will be offered to the profession generally, without special influence or appointment, it is not only of value in itself but as a precedent to similar medical institutions.